
THE
IRON AND STEEL WORKS
OF
THE UNITED STATES.
ALSO OF CANADA AND MEXICO.

1898.

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DIRECTORY
TO THE
IRON AND STEEL WORKS
OF
THE UNITED STATES.

EMBRACING

A FULL LIST OF THE BLAST FURNACES, ROLLING MILLS,
STEEL WORKS, RAIL MILLS, STRUCTURAL MILLS, PLATE AND
SHEET MILLS, TINPLATE WORKS, STEEL CASTING WORKS,
WIRE-ROD AND WIRE MILLS, CUT-NAIL WORKS, WIRE-
NAIL AND HORSE-NAIL WORKS, BOLT, NUT, AND
RIVET WORKS, CHAIN WORKS, STAMPING WORKS,
BRIDGEBUILDING AND SHIPBUILDING WORKS,
CAR-AXLE, CAR-WHEEL, AND CARBUILDING
WORKS, LOCOMOTIVE WORKS, MALLEABLE
IRON WORKS, TUBE WORKS, CAST AND
WROUGHT IRON AND STEEL AND IRON
AND STEEL RIVETED PIPE WORKS,
AND FORGES AND BLOOMARIES.

TO WHICH IS ADDED A COMPLETE LIST OF THE IRON AND
STEEL WORKS OF CANADA AND MEXICO.

COMPILED AND PUBLISHED
BY THE AMERICAN IRON AND STEEL ASSOCIATION.

FOURTEENTH EDITION. CORRECTED TO APRIL 1, 1898.

PHILADELPHIA:
THE AMERICAN IRON AND STEEL ASSOCIATION,
No. 261 SOUTH FOURTH STREET.
1898.

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PREFACE TO THE FOURTEENTH EDITION.

THE fourteenth edition of the Directory to the Iron and Steel Works of the United States, Canada, and Mexico is presented herewith to the members of the American Iron and Steel Association and to the whole American Iron Trade. Another edition of the Directory need not be looked for until late in the year 1900. The labor and expense of compiling and printing the Directory increase with every edition. It has always been our aim to make each edition superior to its immediate predecessor. In the present edition many new and valuable features have been introduced, while all the old features have been retained. With scarcely an exception the information contained in its pages has been obtained by direct correspondence with the firms, companies, and individuals whose works are described or even referred to, and in all cases the utmost pains have been taken to guard against errors in referring to the details of the thousands of plants that are described and in spelling the thousands of proper names that are mentioned. It has been a serious and severe task to prepare this edition—one that has tried the patience and endurance of the clerical force of the American Iron and Steel Association as they have never been tried before.

The present edition embraces 396 printed pages, 62 pages more than the edition of 1896. The increased size of the volume is due to the enlarged description of many of the rolling-mill, steel-making, and other plants heretofore described in the Directory; to the erection in the last two years of new furnaces, rolling mills, steel works, and tinplate plants; and to the addition of many lists of consumers of iron and steel that have not appeared in previous editions. The edition of 1896 contained complete lists of all the blast furnaces, rolling mills, Bessemer steel works, open-hearth steel works, crucible steel works, plate and sheet mills, cut-nail works, tinplate works, stamping works, forges and bloomeries, wire-rod and wire mills, wire-nail works, iron and steel bridgebuilders, iron and steel shipbuilders, horse-nail works, locomotive works, malleable iron works, cast-iron pipe works, wrought-iron and wrought-steel pipe works, car-axle works, car-wheel works, and carbuilders in the United States; also a list of the iron and steel works in Canada and Mexico. To these are now added complete lists of the rail mills, structural mills, steel casting works, bolt, nut, and rivet works, chain works, seamless tube works, skelp mills, and riveted pipe works. The names and location of all the works described are given in alphabetical order, followed usually by a description of their character, capacity, and products, with the names of the principal offi-

cers, etc., including the names of selling agents. A table of contents and indexes to the names of firms and companies, the names of works, and brands of pig iron will assist the reader in promptly turning to any desired information. The body of the volume has been corrected to April, 1898, but a supplementary chapter brings down all information to June. We have not anticipated a few changes in ownership which we are advised will occur after June, as the object of the Directory is to record only accomplished facts.

Blast Furnaces.—It is always a most difficult matter to compile a list of blast furnaces which are either active or may truthfully be said to be likely to be some day active. There are some idle furnaces which, if we were to use our own judgment, we would now promptly class as abandoned, but their owners insist that they are in good condition and are not abandoned. Because they insist upon it, and because we would not even seem to do injustice to any one, we retain these furnaces in our so-called active list and we include their capacity in the aggregate blast-furnace capacity of the country. But in the present Directory we have adopted a new method of indicating the furnaces that are really active or that are undoubtedly entitled to be counted in the active list. At the end of every blast-furnace description we mention when the furnace or furnaces referred to were last in operation. The reader can tell, therefore, at a glance what may reasonably be expected of every furnace in the list. We have also not hesitated to transfer to the abandoned list every furnace that has actually been abandoned or which we are advised is not likely to run again.

In the edition of 1896, more than in any of its predecessors, we pruned the blast-furnace list of all recently abandoned furnaces and of all long-idle furnaces against the removal of which to the abandoned list there was little or no protest. There remained 469 furnaces in the so-called active list of that year, or just 100 less than in 1892 and just 50 less than in 1894. In the present edition, after still more thoroughly eliminating recently abandoned or long idle furnaces, and after allowing for new furnaces built since the Directory for 1896 appeared, we enumerate only 420 furnaces in the so-called active list. Of these furnaces we feel sure that about 50 will never make another ton of pig iron; so that we have to-day in this country not more than 370 furnaces that are either active or are likely to become active at any time in the future. But most of these are thoroughly equipped modern furnaces, and many of them are furnaces of great capacity.

The total annual capacity of the 469 furnaces that were described in the edition of 1896 was 17,373,637 gross tons, and the average annual capacity of the furnaces was 37,044 tons. In the present edition the total annual capacity of the 420 furnaces that are described is 19,081,587 tons, and their average annual capacity is 45,432 tons. A great increase in capacity from 1896 to 1898 is shown by these figures, not-

withstanding the fact that many of the furnaces that were idle in 1896 but which then seemed, to their owners at least, to have a chance to run again in better times are now out of the race entirely, and with their transfer to the abandoned list of the present edition of the Directory their capacity disappearing also. As already stated, there are probably 50 furnaces in the present list of 420 furnaces that in our opinion will never run again, because they are antiquated or badly situated, so that a perfectly fair estimate of the actual capacity of the completed furnaces in this country to-day will place it in round numbers at about 18,000,000 tons. Of course, as has often been explained, it is never possible to employ at the same time all the furnace capacity of the country. We have made a careful calculation of the capacity of the furnaces that were either in blast in April last or which could then have been readily put in blast, with the following result:

STATES—GROSS TONS.	FURNACES.	Anthracite.	Bituminous.	Charcoal.	Total.
Massachusetts, . . .	3	.....	.....	15,000	15,000
Connecticut,	5	.....	.....	24,000	24,000
New York,	14	314,000	325,000	10,000	649,000
New Jersey,	5	109,000	.....	.....	109,000
Pennsylvania,	133	1,913,900	5,648,500	19,400	7,581,800
Maryland,	6	.....	358,000	11,000	369,000
Virginia,	20	.....	679,500	2,250	681,750
West Virginia, . . .	3	.....	220,000	.....	220,000
Kentucky,	5	.....	180,000	.....	180,000
Tennessee,	14	.....	472,000	41,000	513,000
North Carolina, . . .	1	.....	5,200	.....	5,200
Georgia,	2	.....	36,000	15,500	51,500
Alabama,	36	.....	1,750,000	95,500	1,845,500
Texas,	1	.....	.....	10,000	10,000
Ohio,	50	.....	2,642,000	27,850	2,669,850
Illinois,	17	.....	1,500,000	.....	1,500,000
Michigan,	8	.....	.....	212,500	212,500
Wisconsin,	6	.....	230,000	67,000	297,000
Missouri,	3	.....	70,000	20,000	90,000
Colorado,	3	.....	200,000	.....	200,000
Oregon,	1	.....	.....	15,000	15,000
Total,	336	2,336,900	14,316,200	586,000	17,239,100

Included in the total number of completed furnaces now described are 8 new furnaces using bituminous fuel and 1 using charcoal which have been built since the appearance of the edition of 1896, namely, the 4 magnificent furnaces of the Carnegie Steel Company, Limited, at Duquesne; the large furnace of the Punxsutawney Iron Company, at Punxsutawney, Pa.; the almost equally large furnace of the Union Iron Works, at Buffalo, N. Y.; the large Steelton Furnace of the King, Gilbert, and Warner Company, at Columbus, Ohio; the Milton Furnace of the Wellston Iron and Steel Company, at Wellston,

Ohio; and the Pioneer Furnace (charcoal) of the Cleveland-Cliffs Iron Company, at Gladstone, Michigan. In the present edition we transfer to the abandoned list 58 furnaces from the active list of 1896, of which 23 used anthracite and mixed anthracite and coke, 17 used bituminous coal and coke, and 18 used charcoal. Deducting these 58 furnaces from the 469 furnaces that were described in 1896 and adding the 9 new furnaces that have since been completed gives us the 420 furnaces that we now place in the so-called active list.

Of the 9 new furnaces that have been built since 1896 1 is in New York, 5 are in Pennsylvania, 2 are in Ohio, and 1 is in Michigan. Of the 58 furnaces now transferred to the abandoned list 1 is in Connecticut, 5 are in New York, 2 are in New Jersey, 22 are in Pennsylvania, 1 is in Maryland, 1 is in Virginia, 2 are in Tennessee, 1 is in Georgia, 6 are in Alabama, 10 are in Ohio, 2 are in Indiana, 3 are in Michigan, 1 is in Missouri, and 1 is in Washington. Indiana and Washington now disappear entirely from the list of pig-iron producing States. We also transfer to the abandoned list a furnace in Utah which never was built but work upon which had been commenced.

In addition to the 420 completed furnaces that are now described mention is made of 4 furnaces that were in course of erection in April last, while 8 others were either projected or partly built and work upon them had been suspended. Of these 8 furnaces only one, Carnegie Furnace, at Johnson City, Tennessee, is likely to be put in blast in the near future. The 4 furnaces that are mentioned as in course of erection in April last will probably be completed this year. They are all to be large furnaces. The Reading Iron Company is building one at Reading, to be 80 by 17 feet, with an annual capacity of 75,000 tons. The Oliver and Snyder Steel Company is building a new furnace at Allegheny to take the place of the present Edith Furnace in the same city. It will be 100 by 20 feet and will have an annual capacity of 150,000 tons. The Lorain Steel Company is building two furnaces at Lorain, to be 100 by 22 feet each, and to have jointly an annual capacity of 350,000 tons. When these 4 furnaces are completed and the Carnegie Furnace in Tennessee is in operation the estimated annual furnace capacity of the country will be increased in round numbers about 500,000 tons, making our total available annual capacity at the end of 1898 or soon after about 18,500,000 tons. Surely we do not need any more new furnaces.

Of the 469 furnaces described in the edition of the Directory for 1896 96 used charcoal as fuel and 373 used anthracite and bituminous coal and coke. Of the 420 furnaces described in the present edition 79 use charcoal and 341 use anthracite and bituminous coal and coke. The aggregate annual capacity of the charcoal furnaces is now 957,400 tons, and that of the mineral fuel furnaces is 18,124,187 tons. It may be here mentioned that in 1897 the production of charcoal pig iron in the

United States was 255,211 tons, while that of the anthracite and bituminous furnaces combined was 9,397,469 tons. These figures show the severity of the struggle for existence through which the charcoal pig-iron industry is now passing.

The average annual capacity of all the charcoal furnaces that are described in the present edition is 12,119 tons, against 11,443 tons in 1896, and that of all the mineral fuel furnaces is 53,150 tons, against 43,633 tons in 1896.

Rolling Mills and Steel Works.—While there has been a great enlargement of our blast-furnace capacity since 1896 there has been a similar increase in the same period in the capacity of the rolling mills and steel works. In the present edition we describe 504 completed rolling mills and steel works, of which 462 contain trains of rolls and 42 have no rolls. In the edition of 1896 we described 505 completed rolling mills and steel works. Since its appearance 32 new rolling mills and steel works have been built and 33 have been abandoned, showing a net decrease of 1. In April, 1898, there were 4 rolling mills in course of erection, against 5 rolling mills and steel plants building in January, 1896. Omitting all forged products the annual capacity in finished products of the rolling mills in April, 1898, was 17,929,850 gross tons, against 14,763,920 tons in January, 1896.

Puddling Furnaces.—The number of puddling furnaces in April, 1898, each double furnace counting as two single furnaces, was 3,889, against 4,408 in January, 1896, a decrease of 519. The highest number of puddling furnaces reported in any edition of the Directory was in 1884, when 5,265 were mentioned. In 1892 there were still 5,120 in existence, and in 1894 there were 4,715.

Bessemer Steel Works.—The total number of completed Bessemer steel works in April, 1898, including 2 Clapp-Griffiths plants and 1 Robert-Bessemer plant, was 45, with 1 works projected, against 50 completed works in January, 1896, and 1 works that was then partly built. Of the works described in 1896 we have transferred to the abandoned list the small basic Bessemer plant of the Buffalo Iron Company, at Chattanooga, Tenn.; the Robert-Bessemer plants of the Chester Steel Castings Company, at Chester, Pa., and the Fowler Foundry Company, at Chicago; the Walrand-Legeniscl plant of the Potter and Hollis Foundry Company, at Chicago; and the Clapp-Griffiths plant of the Oliver Iron and Steel Company, at Pittsburgh—5 plants in all. The plant that was partly built in 1896 was the Robert-Bessemer plant of the Union Steel and Iron Company, at St. Joseph, Mo., which we now also transfer to the abandoned list. It will be observed that the "little" Bessemer plants have not grown in favor in this country and are rapidly disappearing. The 45 Bessemer plants which are described in the present edition contain exactly 100 converters, against 109 converters in the 50 plants described in 1896. The annual converting capac-

ity of the 45 plants of 1898 is 10,633,000 gross tons, against 9,602,450 tons in 1896. No new Bessemer steel plants have been built since January, 1896. The new plant that is projected is that of the Woodsons Steel Company, on the Monongahela river, 24 miles above Pittsburgh.

Open Hearth Steel.—In the Directory for 1896 we described 88 completed open-hearth steel plants and in the present Directory we describe 99 completed plants. In 1896 there were 225 open-hearth furnaces, 17 building, and 3 partly built: total, 245. In April last there were 281 furnaces, 2 building, and 3 partly built: total, 286. The annual capacity of the open-hearth furnaces, built and building, in ingots and direct castings, in April last, was 3,522,250 gross tons, against 2,430,450 tons in 1896.

Basic Steel.—In the present edition of the Directory we have been able to indicate the character of the product made at our open-hearth steel works, whether acid or basic steel, or both. Of the 99 completed open-hearth plants in April last 43 were prepared to make basic steel, and of 10 projected open-hearth plants at that time a majority would probably make basic steel. The prominence which basic open-hearth steel has attained in this country in very recent years is shown in the statistics of our open-hearth steel production in 1897, when we made 1,075,689 tons of basic steel and 556,154 tons of acid steel. The Troy Steel Company is prepared to make basic Bessemer steel.

Open Hearth Steel Castings.—In 1894 there were 28 open-hearth steel plants which were prepared to make direct castings, in 1896 there were 35 plants, and in 1898 there are 47 plants. In addition to these plants there are enumerated in the present edition of the Directory several crucible steel casting plants and a few plants which make Bessemer and other steel castings.

Crucible Steel Works.—In April last we had 45 completed crucible steel plants and 1 projected plant. The aggregate annual capacity of the existing crucible steel works is 95,000 gross tons, against 98,700 tons in 1896.

Iron and Steel Rail Mills.—All works which are prepared to manufacture standard, girder, light T, and other rails are classified separately from rolling mills and steel works in the present edition. The whole number is 51. One additional rail mill is being built at Kansas City, Kansas, to renew steel rails by the McKenna process. A mill to renew rails by this process was built at Joliet, Illinois, in 1897, and was in operation in that year.

Structural Mills.—The whole number of works which are now equipped to manufacture all kinds of structural material, including bridge rods, building rods, plates for bridge work, structural tubing, etc., is 66, and these are also classified separately from the rolling mills and steel works.

Plate, Sheet, and Skelp Mills.—Exactly 16 pages of the present edition

are devoted to a separate classification of the plate, sheet, and skelp mills, of which there were 230 completed in April, 1898, 2 building, 1 partly built, and 1 projected. The special products of each mill are stated in sufficient detail.

Tinplate Works.—Immediately following the plate, sheet, and skelp mills are the tinplate works, of which there were in April, 1898, 69 completed, 1 building, and 1 projected. The description of each works is the most complete we have ever printed, all essential details, including brands, being given. The list of tinplate works occupies 15 pages.

Cut Nail Machines.—In January, 1892, there were 65 rolling mills which were devoted in whole or in part to the manufacture of cut nails and spikes, and which contained 5,546 nail machines. In January, 1894, there were 55 mills and 5,094 nail machines. In January, 1896, there were 53 mills and 4,598 nail machines. In April, 1898, there were 46 mills, 9 works which bought their nail plate, and 4,544 nail machines in all.

Wire Rods and Wire.—In the present Directory we enumerate 24 completed wire rod mills and 1 projected mill, against 23 completed mills in 1896; also 74 completed iron or steel wire-drawing plants, and in addition 1 plant building and 1 projected, against 73 completed and 1 to be rebuilt in 1896.

Wire Nail Works.—In the Directory for 1896 we enumerated 53 completed wire-nail works and 1 works to be rebuilt. In the present edition we enumerate 79 completed wire-nail works and 1 building.

Cars, Car Axles, Car Wheels, and Locomotives.—Omitting railroad companies which manufacture, in part at least, their own cars, car axles, car wheels, and locomotives, we enumerate in the present edition 121 completed carbuilding works, 62 car-axle works, 110 car-wheel works, and 24 locomotive works.

Ships and Bridges.—In April, 1898, there were 44 iron and steel ship yards and 87 iron and steel bridgebuilding works, all of which are described in the present edition. The list of bridgebuilding works does not include contractors or railroad companies which build bridges, but only independent works with iron and steel bridgebuilding plants.

Pipe and Tube Works.—We enumerate in the present edition 33 completed and 1 partly erected cast-iron gas and water pipe works; 37 completed and 1 projected cast-iron soil and plumbers' pipe works; 28 wrought-iron and wrought-steel pipe works; 15 iron and steel riveted pipe works; and 30 seamless-drawn steel tube, brazed tube, and lock-jointed tube works.

Iron and Steel Chain Works.—We describe 98 completed chain works and 1 partly erected works. Sizes are given in all cases where this information has been furnished by the manufacturers. Makers of light and bicycle chains are included in the list as well as manufacturers of cable, dredge, quarry, lumber, railroad, and other heavy chains.

Bolt, Nut, and Rivet Works.—Ten pages of the present edition are devoted to a description of the iron and steel bolt, nut, and rivet works of the country, of which there were 117 in April, 1898.

Malleable Iron Works, Stamping Works, and Horse Nail Works.—We enumerate 88 completed malleable iron works and 1 building, 66 stamping works, and 12 horse-nail works.

Forges and Bloomaries.—Although there are some indications of a revival of interest in the manufacture of charcoal blooms from pig and scrap iron for conversion into plates, rivets, screws, forgings, etc., the number of independent pig and scrap iron bloomaries in April last was only 10, of which several were idle. This is 4 less than were enumerated in 1896. The number of forges which now make blooms directly from the ore is reduced to 2, both in New York, while of all the Southern forges that once made bar iron directly from the ore only one is left, Helton Forge, in North Carolina. An experimental forge at Harriman, Tennessee, for the production of iron blooms from the ore, is idle.

Natural Gas.—In the present edition we enumerate 94 completed iron and steel works and 2 in course of erection which use natural gas in whole or in part, as follows: 41 in Allegheny county and 20 in other parts of Western Pennsylvania, with 1 building; 2 in West Virginia; 7 in Ohio; and 24 in Indiana, with 1 building: total 96. The total number of works which used natural gas in January, 1896, was 89, with 1 building.

Canada and Mexico.—We have revised the lists of blast furnaces, rolling mills, and steel works in Canada and Mexico which were first given in the Directory for 1892. Canada now has 8 completed blast furnaces and 1 building, 17 rolling mills, and 1 open-hearth steel plant, while Mexico has 21 completed blast furnaces and 2 building, 7 rolling mills, and 2 partly completed open-hearth steel plants, of which one will certainly be built. The new furnace that is being built in Canada is at Deseronto, Ontario. We scarcely need add that all the completed iron and steel enterprises in Mexico are small. J. M. S.

NO. 261 SOUTH FOURTH STREET, PHILADELPHIA, JUNE 20, 1898.

SUMMARY BY STATES.

BLAST FURNACES.

STATES.	Furnaces Completed, April 1, 1898.				Furnaces Building, April 1, 1898.				Annual Capacity of Completed Furnaces, April 1, 1898, in gross tons.			
	Anthracite.	Bituminous.	Charcoal.	Total.	Anthracite.	Bituminous.	Charcoal.	Total.	Anthracite.	Bituminous.	Charcoal.	Total—Gross tons.
Massachusetts,		3	3								15,000	15,000
Connecticut,		5	5								24,000	24,000
New York, . . 12	4	3	19						390,500	325,000	15,000	730,500
New Jersey, . 10			10						230,862			230,862
Pennsylvania, 72	78	12	162	1	1		2	2,388,125	5,789,500	46,000		8,223,625
Maryland,	5	3	8							367,000	14,300	381,300
Virginia,	23	4	27							815,500	22,750	838,250
West Virginia, . . .	4		4							236,000		236,000
Kentucky,	6	3	9							210,000	49,500	259,500
Tennessee,	12	7	19							526,000	110,000	636,000
North Carolina, . . .	2		2							40,200		40,200
Georgia,	2	2	4							63,000	24,500	87,500
Alabama,	37	8	45							1,965,000	128,000	2,093,000
Texas,		4	4								55,000	55,000
Ohio,	47	8	55		2		2			2,727,500	32,350	2,759,850
Illinois,	17		17							1,500,000		1,500,000
Michigan,		13	13								319,000	319,000
Wisconsin,	4	2	6							230,000	67,000	297,000
Minnesota,	1		1							50,000		50,000
Missouri,	2	1	3							70,000	20,000	90,000
Colorado,	3		3							200,000		200,000
Oregon,		1	1								15,000	15,000
Total,	94	247	79	420	1	3		4	3,009,487	15,114,700	957,400	19,081,587

From January, 1896, to April, 1898, we have transferred to the abandoned list 58 furnaces: 1 in Connecticut, 5 in New York, 2 in New Jersey, 22 in Pennsylvania, 1 in Maryland, 1 in Virginia, 2 in Tennessee, 1 in Georgia, 6 in Alabama, 10 in Ohio, 2 in Indiana, 3 in Michigan, 1 in Missouri, and 1 in Washington. During the same period 9 furnaces have been built or revived: 1 in New York, 5 in Pennsylvania, 2 in Ohio, and 1 in Michigan. On April 1, 1898, there were 8 furnaces which were projected, some of which were partly built and work on them temporarily suspended, located in the following States: Pennsylvania, 1; Virginia, 2; Tennessee, 2; Alabama, 1; and Ohio, 2. Since April 1, 1898, three additional furnaces have been abandoned, namely, 2 anthracite coal and coke furnaces in Pennsylvania and 1 charcoal furnace in Michigan, but these furnaces are necessarily included in the above table.

SUMMARY BY STATES.

ROLLING MILLS, STEEL WORKS, TINPLATE WORKS, ETC.

STATES.	Rolling Mills and Steel Works.	Iron and Steel Rolling Mills.*	Cut-Nail Machines.	Steel Works.					Tinplate Works.	Forges and Bloomeries.
				Bessemer.	Clapp-Griffiths.	Robert-Bessemer.	Open-hearth.	Crucible.		
Maine,	1	1	...	..	..	..	..	..	..	..
New Hampshire,	1	1	...	..	..	..	1	..	..	..
Massachusetts,	12	11	346	..	1	..	4	..	..	..
Rhode Island,	1	1	...	..	..	..	..	..	..	..
Connecticut,	9	8	25	..	..	..	1	3	..	..
New York,	23	20	...	1	..	..	4	4	3	2
New Jersey,	21	18	193	..	..	..	5	6	..	1
Pennsylvania,	225	210	1,280	19	1	..	48	21	31	8
Delaware,	10	9	...	..	..	..	1	..	..	..
Maryland,	5	5	20	1	..	..	..	1	4	1
Virginia,	7	7	137	1	..	..	..	..	1	..
West Virginia,	7	7	809	2	..	..	..	..	2	..
Kentucky,	9	9	126	1	..	..	2	..	1	..
Tennessee,	4	3	79	..	..	..	..	1	..	1
North Carolina, . . . . .	...	...	...	..	..	..	..	..	..	1
Georgia,	1	1	...	..	..	..	..	..	..	..
Alabama,	10	9	72	..	..	..	3	..	..	..
Texas,	1	1	...	..	..	..	..	..	..	..
Ohio,	67	62	654	7	..	..	10	2	16	..
Indiana,	33	29	291	3	..	..	5	1	6	..
Illinois,	26	24	397	5	..	..	8	1	3	..
Michigan,	3	3	...	..	..	1	1	1	1	..
Wisconsin,	6	3	...	1	..	..	3	3	..	..
Minnesota,	3	3	...	..	..	..	1	..	..	..
Missouri,	7	6	50	..	..	..	1	..	1	..
Iowa,	1	1	...	..	..	..	..	..	..	..
Kansas,	1	...	...	..	..	..	..	1	..	..
Colorado,	2	2	...	1	..	..	..	..	..	..
Wyoming,	1	1	...	..	..	..	..	..	..	..
Washington,	1	1	...	..	..	..	..	..	..	..
Oregon,	1	1	...	..	..	..	..	..	..	..
California,	5	5	65	..	..	..	1	..	..	..
Total,	504	462	4,544	42	2	1	99	45	69	14

Number of rolling mills building in April, 1898, 4. Number of tinplate works building in April, 1898, 1.

*Excludes all steel works that contain no hot trains of rolls.

The number of wire-nail works in the United States is 79 completed and 1 building, located in 17 States, as follows: Massachusetts, 6; Rhode Island, 1; Connecticut, 1; New York, 8; New Jersey, 1; Pennsylvania, 13; Maryland, 2; West Virginia, 1; Ohio, 12; Indiana, 5; Illinois, 17; Michigan, 1; Wisconsin, 4; Missouri, 1; Kansas, 1; Washington, 2; and California, 3.

GRAND SUMMARY.

CAPACITY AND NUMBER OF IRON AND STEEL WORKS.	April, ° 1898.	January, 1896.
Number of completed Blast Furnaces—247 Bituminous, 94 Anthracite and Coke, and 79 Charcoal: total,	420	469
Number of Blast Furnaces building,	4	10
Annual capacity of completed Blast Furnaces, gross tons, . . .	19,081,587	17,373,637
Annual capacity of the Bituminous Furnaces, gross tons, . . .	15,114,700	13,118,600
Annual capacity of the Anthracite Furnaces, gross tons, . . .	3,009,487	3,156,487
Annual capacity of the Charcoal Furnaces, gross tons,	957,400	1,098,550
Number of completed Rolling Mills and Steel Works,	504	505
Number of Rolling Mills and Steel Works building,	4	5
Number of Single Puddling Furnaces, (a double furnace counting as two single ones,)	3,889	4,408
Number of Heating Furnaces,	3,479	3,356
Annual capacity of completed Rolling Mills, double turn, gross tons, (omitting all forged products,)	17,929,850	14,763,920
Number of Rolling Mills having Cut-nail Factories,	46	53
Number of Cut-nail Machines,	4,544	4,598
Number of Wire-nail Works—79 completed and 1 building, . .	79	53
Number of completed standard Bessemer Steel Works,	42	43
Number of standard Bessemer Converters,	95	99
Annual capacity of these converters (built and building) in ingots and direct castings, gross tons,	10,552,000	9,472,350
Number of completed Clapp-Griffiths Steel Works,	2	3
Number of Clapp-Griffiths Converters,	3	5
Number of completed Robert-Bessemer Steel Works,	1	3
Number of Robert-Bessemer Converters,	2	5
Number of Walrand-Legenisel Steel Works,	1	1
Number of completed Open-Hearth Steel Works,	99	88
Number of Open-Hearth Steel Works building,	4	4
Number of Open-Hearth Steel Furnaces—281 completed, 2 building, and 3 partly built,	281	225
Annual capacity (built and building) in ingots and direct castings, gross tons,	3,522,250	2,430,450
Number of completed Crucible Steel Works,	45	45
Number of Steel-melting Pots which can be used at each heat,	2,952	3,094
Annual capacity in ingots and direct castings, gross tons, . .	95,000	98,700
Number of completed Tinplate Works,	69	69
Number of Tinplate Works building,	1	4
Number of Forges making wrought iron from ore,	4	9
Annual capacity in blooms and billets, double turn, gross tons,	4,075	17,075
Number of pig and scrap iron Bloomeries,	10	14
Annual capacity in blooms, double turn, gross tons,	30,050	37,650

THE
IRON AND STEEL WORKS
OF
THE UNITED STATES.

FURNACES NOW ACTIVE OR WHICH HAVE
RECENTLY BEEN ACTIVE.

Unless otherwise stated all the furnaces in this list, which has been corrected to April 1, 1898, are now active or have recently been in blast. Furnaces which have been idle for several years but are in fair condition are retained in the active list but are noted as having been idle. A list of recently abandoned furnaces or furnaces which are likely to remain long inactive will be found beginning on page 63. A tabulated statement showing the capacity of the active furnaces or of furnaces that could readily be put in blast will be found on a preceding page.

The telegraph address is given only when it is not the same as the post-office address. The dimensions relate to the present size of furnaces. When the power is not mentioned steam-power is understood.

MASSACHUSETTS.

CHARCOAL.

Richmond Iron Works, main office, Richmond Furnace P. O., Berkshire county. Three stacks, all in Berkshire county: Richmond Furnace, at Richmond, 32 x 9½, built in 1829 and rebuilt in 1863; steam-power. Van Deusenville Furnace, at Van Deusenville, 32 x 9½, built in 1834 and rebuilt in 1858; water-power. Cheshire Furnace, at Cheshire, 32 x 9½, built in 1850 and rebuilt in 1870; steam-power. All use warm blast; iron stoves; ore, local brown hematite from mines owned by the works; total annual capacity, 15,000 gross tons

of foundry pig iron for cannon, car-wheels, and machinery. Brand, "Richmond." George Church, President, Great Barrington, Mass.; M. H. Robbins, Vice-President, Lakeville, Conn.; George Coffing Warner, Secretary, Great Barrington, Mass.; R. A. Burget, Treasurer and General Manager, Richmond Furnace.—*Active in 1898.*

Number of furnaces in Massachusetts: 3 charcoal stacks.

CONNECTICUT.

CHARCOAL.

Canaan Furnaces, Barnum Richardson Company, Lime Rock, Litchfield county. Furnaces at East Canaan, Litchfield county. Two stacks: No. 1, 40 x 9½, built in 1840 and rebuilt in 1880; No. 3, 35 x 9, built in 1872; No. 1 has closed top and No. 3 open top; hot blast; steam and water power; ore, Salisbury brown hematite; product, pig iron for car-wheels and malleable castings, known as "Salisbury" iron; total annual capacity, 10,000 gross tons. M. B. Richardson, President; C. W. Barnum, Vice-President; Porter S. Burrall, Secretary and Treasurer. Selling agents, C. R. Ellicott & Co., Fidelity Building, Philadelphia.—*Active in 1898.*

Landon Furnace, Salisbury Carbonate Iron Company, lessee, 93-95 Nassau st., New York City. Furnace at Chapinville P. O., Litchfield county. One stack, 32 x 9, built in 1825, burned in 1879, and rebuilt in 1881 and in 1890; warm blast; steam and water power; one Gifford stove; ores, roasted carbonate from Amenia, New York, and Kelley, Amenia, and Shaker hematites; product, pig iron for gun castings, gun carriages, car-wheels, chilled rolls, and malleable castings; specialties, pig iron for gun castings, with a tensile strength of from 30,000 to 40,000 pounds, and iron for car-wheels; annual capacity, 4,500 gross tons. Brands, "Salisbury" and "Carbonate." J. J. Morehouse, President and Treasurer, and A. M. Card, Secretary, New York City. All sales made by the company. Owned by The Landon Iron Company, Chapinville, Connecticut.—*Active in 1898. See Charcoal Furnaces in New York.*

Lime Rock Iron Company, Lime Rock, Litchfield county. Established in 1734; first incorporated in 1828; incorporated by the present company in 1863; present furnace, one stack, 32 x 9, built in 1864; warm blast; water-power; open top; ore, Salisbury brown hematite; product, pig iron for car-wheels, malleable castings, ordnance, and machinery; annual capacity, 5,000 gross tons. M. H. Robbins, President; Milo B. Richardson, Secretary and Treasurer. Selling agents, C. R. Ellicott & Co., Fidelity Building, Philadelphia.—*Active in 1897.*

Sharon Valley Iron Company, Sharon Valley, Litchfield county. One stack, 31 x 9½; very old; rebuilt in 1863; hot blast; water-power; open top; ore, Salisbury; product, Salisbury car-wheel pig iron; annual ca-

capacity, 4,500 gross tons. Geo. B. Burrall, President, Lakeville; Milo B. Richardson, Secretary, and Charles W. Barnum, Treasurer, Lime Rock. Selling agents, C. R. Ellicott & Co., Fidelity Building, Philadelphia.—*Active in 1898.*

Number of furnaces in Connecticut: 5 charcoal stacks.

NEW YORK.

MIXED ANTHRACITE AND COKE.

Burden Iron Works, The Burden Iron Company, Troy, Rensselaer county. Two stacks, each 60 x 14½, built in 1865 and 1867; three Gordon-Whitwell stoves; fuel, anthracite coal and coke; ores, magnetic from Northern New York, hematite and carbonate from Eastern New York, and Lake Superior; product, forge pig iron; total annual capacity, 50,000 gross tons.—*Active in 1896. See Rolling Mills in New York.*

Cedar Point Furnace, Witherbee, Sherman & Co., Port Henry, Essex county. One stack, 71 x 16, built in 1872-3 and first put in blast August 12, 1875; four 22-foot Whitwell stoves; fuel, anthracite coal and coke; ores, Old Bed Lake Champlain and New Bed Bessemer Lake Champlain; product, foundry, mill, and Bessemer pig iron; annual capacity, 36,000 gross tons. Brand, "Cedar Point." Selling agents, Rogers, Brown & Co., New York, Buffalo, and Cincinnati.—*Active in 1896.*

Charlotte Furnace, Charlotte Iron Works, P. O. Box 218, Charlotte, Monroe county. One stack, 65 x 15, built in 1868 and rebuilt in 1884; three 18-pipe ovens; fuel, anthracite coal and coke; ores, local hematite, with a mixture of Lake Champlain and Lake Superior magnetic; product, foundry pig iron, especially adapted for stove plates and suitable for general foundry purposes; annual capacity, 18,000 gross tons. Brand, "Charlotte." A. G. Yates, President; J. E. Roberts, Vice-President and Treasurer; H. P. Roberts, Secretary.—*Idle since 1892.*

Crown Point Furnaces, Crown Point Iron Company, Crown Point, Essex county. Two stacks, situated on the bank of Lake Champlain, 60 x 17 and 70 x 18, built in 1872-3; the second stack rebuilt in 1881; six Siemens-Cowper-Cochrane stoves, three 45 x 15 and three 60 x 16; fuel, anthracite coal and coke; product, Bessemer pig iron, produced from Crown Point (or Penfield) and Chateaugay ores; total annual capacity, 40,500 gross tons. Brand, "Crown Point." James P. Dickson, President, and Talbot Olyphant, Secretary and Treasurer, 21 Cortlandt st., New York. Sales made from the New York office of the company. Talbot Olyphant and Thomas Montague, Receivers.—*Idle since 1892.*

Kirkland Furnace, Kirkland, Oneida county. One stack, 65 x 14, built

in 1873, reconstructed in 1882, and changed from water to steam power; again reconstructed in 1889; fuel, anthracite coal and coke; ores, local fossiliferous, Northern New York hematite, and Lake Champlain magnetic; specialty, foundry pig iron; annual capacity, 18,000 gross tons. Brand, "Kirkland." Owned by I. A. Williams and the Estate of T. W. Dwight. Address all communications to I. A. Williams, Utica.—*Idle since the fall of 1890 and for sale.*

Poughkeepsie Iron Company, A. E. Tower, Agent, Poughkeepsie, Dutchess county. Two stacks: one, 60 x 15½, built in 1860, and the other, 70 x 16, built in 1860 and rebuilt in 1893; five Gordon stoves; fuel, anthracite coal and coke; ores, ⅓ Dutchess county brown hematite, ⅓ Port Henry magnetic, and ⅓ Forest of Dean, Orange county; product, foundry and forge pig iron; total annual capacity, 68,000 gross tons. Brand, "Poughkeepsie." A. E. Tower, President, Treasurer, and Agent; H. N. Brinsmade, Secretary. Selling agents, Crocker Brothers, 32 Cliff st., New York.—*Active in 1896.*

Troy (The) Steel Company, Troy. Furnaces on Breaker Island, Albany county, opposite Troy. Three stacks, each 80 x 18, built in 1886-7; twelve Whitwell stoves; fuel, anthracite coal and coke; ores, magnetic from Essex and Columbia counties; product, Basic-Bessemer pig iron; total annual capacity, 160,000 gross tons. (Formerly operated by the Troy Steel and Iron Company.)—*Active in 1897. See Rolling Mills and Steel Works in New York.*

Number of mixed anthracite and coke furnaces in New York: 12 stacks.

COKE.

Buffalo Furnace, Buffalo Furnace Company, Buffalo, Erie county. One stack, 80 x 18, built in 1892 and first blown in February 25, 1893; four Cowper-Kennedy stoves; fuel, coke; ore, Lake Superior hematite; product, strong foundry pig iron; annual capacity, 80,000 gross tons. Brand, "Buffalo." L. C. Hanna, President; C. C. Bolton, Vice-President and Treasurer; A. S. Hubbell, Secretary; F. E. Bachman, Manager. Selling agents, M. A. Hanna & Co., Cleveland, Ohio.—*Active in 1898.*

Niagara Furnaces, Tonawanda Iron and Steel Company, North Tonawanda, Niagara county. Two stacks: Furnace A, 76 x 17¾, built in 1873 and rebuilt in 1890-1; Furnace B, 80 x 18, built in 1895 and blown in November 5, 1896; six Cowper-Kennedy stoves, three 70 x 18 and three 80 x 18; fuel, coke; ores, hematite and specular from Lake Superior; product, foundry and malleable pig iron; total annual capacity, 165,000 gross tons. Brand, "Niagara." William A. Rogers, President; Archer Brown, Vice-President; William M. Mills, Secretary; David B. Gamble, Treasurer; W. B. Kerr, Superintendent. Selling agents, Rogers, Brown & Co., Boston, Buffalo, New York, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Phila-

delphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis.—*Active in 1898.*

Union Iron Works, Buffalo, Erie county. One stack, 76 x 17, with shell large enough for a 20-foot bosh, built in 1897-8; four 75 x 20 Cowper-Hartman stoves; fuel, Walston or Connellsville coke; ore, Lake Superior; product, foundry, forge, and malleable pig iron; annual capacity, 80,000 gross tons. Brand, "Union." F. B. Baird, President; A. J. Barnes, Vice-President and Treasurer; T. B. Walker, Manager. Selling agents, C. R. Baird & Co., Bullitt Building, Philadelphia.—*Will blow in about June 1, 1898.*

Number of coke furnaces in New York: 4 stacks.

CHARCOAL.

Phenix Furnace, Estate of Caleb S. Maltby, Millerton, Dutchess county. One stack, 32 x 9, rebuilt in 1840; warm blast; open top; ores, Salisbury from the old Salisbury mine at Ore Hill and neighboring mines; specialty, car-wheel pig iron; annual capacity, 5,000 gross tons. Brand, "Phenix." Edward H. Townsend, Superintendent, Millerton.—*Idle for several years.*

Salisbury Carbonate Iron Company, 93-95 Nassau st., New York City. Two stacks, both leased. Chatham Furnace, at Chatham, Columbia county; one stack, 32 x 9, built in 1873 and blown in in July, 1873; warm blast; open top; leased from C. C. Parker, Ann Arbor, Michigan; (formerly called the Beckley Iron Works.) Copake Iron Works, Copake Iron Works P. O., Columbia county; one stack, 32 x 9, built in 1872; cold and warm blast; open top; iron stoves; leased from the Estate of Frederick Miles, deceased. Ores, roasted carbonate, from Ameniam, New York, and Kelley, Ameniam, and Shaker hematites; product, pig iron for gun castings, gun carriages, car-wheels, chilled rolls, and malleable castings; specialties, pig iron for gun castings, with a tensile strength of from 30,000 to 40,000 pounds, and iron for car-wheels; total annual capacity, 10,000 gross tons. Brands, "Salisbury" and "Carbonate." Sales made by the company.—*Chatham Furnace active in 1898; Copake idle on March 1, 1898, but getting ready to blow in. See Landon Furnace in Connecticut.*

Number of charcoal furnaces in New York: 3 stacks. Total number of furnaces in New York: 19 stacks.

NEW JERSEY.

ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Andover Iron Works, Andover Iron Company, Phillipsburg, Warren county. One stack, No. 1, 75 x 16, built in 1848 and rebuilt in 1886; 3 Siemens-Cowper-Cochrane stoves; fuel, anthracite coal and coke; ores, magnetite from the company's mines and Lake Superior

red hematite; product, foundry, basic open-hearth, and forge pig iron; annual capacity, 40,000 gross tons. Brand, "Andover." (No. 2 stack, 75 x 18, and No. 3 stack, 60 x 18, both built in 1848, abandoned.) William A. Ingham, President, and Charles Gilpin, Jr., Secretary and Treasurer, 240 South Third st., Philadelphia; S. B. Patterson, Superintendent, Phillipsburg.—*Active in 1898.*

Musconetcong Furnaces, Musconetcong Iron Works, Stanhope, Sussex county. Two stacks, 70 x 17 and 80 x 20, built in 1841 and 1843 and rebuilt in 1866 and 1869; No. 1 furnace has iron stoves and No. 2 has one single and one double Cooper-Durham stove; fuel, anthracite coal and coke; ore, magnetic mined in Morris and Sussex counties; specialties, No. 2 foundry and gray forge pig iron; total annual capacity, 51,000 gross tons. Brand, "M. I. W." H. M. Howe, President, and John J. Kirk, Secretary and Treasurer, 229 Drexel Building, Philadelphia; Henry W. Lloyd, Agent, Stanhope, N. J. Selling agents, Crocker Brothers, 32 Cliff st., New York; J. Wesley Pullman, 238 South Third st., Philadelphia. A. Pardee & Co., owners, Drexel Building, Philadelphia.—*Idle since 1892.*

New Jersey (The) Zinc Company, 52 Wall st., New York. Three stacks: Two located at Newark, Essex county, and one in Hudson county. Newark Furnaces: A, 31 x 8, built in 1885 to take the place of two stacks built in 1855 and 1863; and B, 50 x 12, built in 1883 to take the place of a stack built in 1871; Furnace B rebuilt in 1896; fuel, anthracite coal and coke; product, spiegeleisen from zinc residuum; total annual capacity, 10,000 gross tons; George C. Stone, Superintendent; (formerly operated by the New Jersey Zinc and Iron Company.) Hudson County Furnace: one stack, 45 x 10, built in 1883 and first put in blast in February, 1884; rebuilt in 1894; four 21-pipe Cooper-Durham stoves; fuel, anthracite coal; product, spiegeleisen from zinc residuum; annual capacity, 9,000 gross tons; Fritz Gleim, Superintendent; (formerly operated by the Passaic Zinc Company.) S. S. Palmer, President, W. P. Hardenbergh, Vice-President, and Charles B. Squier, Secretary and Treasurer, all at 52 Wall st., New York. All sales made by the company.—*Active in 1898.*

Oxford Iron Works, Oxford, Warren county. One stack, 63 x 17½, built in 1871; two Kent and one Durham iron pipe ovens; fuel, anthracite coal; ore, magnetic mined near the works; product, mill pig iron; annual capacity, 19,000 gross tons. Owned by the Delaware, Lackawanna, and Western Railroad Company, Samuel Sloan, President, 26 Exchange Place, New York City; Edmund T. Lukens, Agent, Oxford.—*Idle since 1895 and for sale. See Rolling Mills in New Jersey.*

Pequest Furnace, Cooper & Hewitt, Oxford, Warren county. New York office, 17 Burling Slip. One stack, 67 x 16, built in 1874 and rebuilt in 1883; Durham iron pipe stoves; fuel, ⅔ anthracite coal and ⅓ Connellsville coke; ores, New Jersey magnetic and foreign;

product, foundry, gray forge, and Bessemer pig iron; iron actually made in one year, 24,862 gross tons. Brand, "Pequest." B. F. Fackenthal, Jr., General Manager, Riegelsville, Pa. (Ringwood Furnace, at Hewitt, 48 x 13, altered from charcoal to anthracite in 1872 and idle for several years, abandoned in 1893.)—*Idle for several years. See Durham Iron Works, Lehigh Valley, Pennsylvania.*

Secaucus Iron Company, Secaucus, Hudson county. Post-office address, Rutherford, Bergen county; telegraph address, Kingsland. One stack, 65 x 17, completed in 1877 and first blown in in June, 1879; Cooper iron pipe stoves; fuel, anthracite coal; ores, foreign hematite and New York and New Jersey magnetic; product, Bessemer pig iron; annual capacity, 27,000 gross tons. Brand, "Secaucus." F. Pardee, President, and I. P. Pardee, Secretary and Treasurer, Hazleton, Pennsylvania. Selling agents, Crocker Brothers, 32 Cliff st., New York City.—*Idle since 1893.*

Wharton Furnace, Port Oram, Morris county. One stack, 75 x 17, built in 1868, first blown in in 1869, remodeled in 1889, and old stack replaced by new steel shell stack in 1892; three regenerative hot-blast stoves; fuel, anthracite coal and coke; ores, Hibernia (New Jersey) magnetic and Lake Superior hematite; product, neutral foundry, forge, and basic open-hearth pig iron; annual capacity, 50,000 gross tons. Brand, "Wharton." (Formerly called Port Oram Furnace.) Joseph Wharton, Proprietor, Philadelphia; Edward Kelly, Manager, Port Oram. Selling agent, Mount Pleasant Mining Company, 68 Wall st., New York City, Benjamin Nicoll, President.—*Active in 1898.*

Number of furnaces in New Jersey: 10 anthracite and mixed anthracite and coke stacks. No charcoal stacks.

PENNSYLVANIA.

LEHIGH VALLEY—ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Allentown Iron Works, Allentown Iron Company, Allentown, Lehigh county. Philadelphia office, 106-108 South Fourth st. Two stacks: No. 4, 60 x 16½, built and blown in in 1886; and No. 5, 60 x 17, built in 1872 and blown in in 1873; fuel, anthracite coal and coke; ores, New York, New Jersey, Pennsylvania magnetic, Lake Superior, and local hematite; specialty, foundry pig iron; total annual capacity, 60,000 gross tons. Brand, "Allentown." (Four stacks, built in 1846 and later years, abandoned.) Lewis A. Riley, President, and C. F. Howell, Secretary and Treasurer, Philadelphia; Edward T. Clymer, Manager, Allentown.—*Active in 1898.*

Allentown (The) Rolling Mills, 229 Drexel Building, Philadelphia. Works at Allentown. Two stacks, each 65 x 16, built in 1864; open tops; two old-style cast-iron stoves; fuel, anthracite coal; ores, local

hematite and New Jersey and New York magnetic; product, mill and foundry pig iron; total annual capacity, 24,000 gross tons.—*Idle since 1894. See Rolling Mills in Eastern Pennsylvania.*

Bethlehem (The) Iron Company, South Bethlehem, Northampton county. Main office, South Bethlehem; Philadelphia office, 421 Chestnut st.; New York office, 100 Broadway; Chicago office, Marquette Building. Five stacks at South Bethlehem, Northampton county: No. 1, 61 x 15½, built and blown in in 1863; No. 2, 70 x 16, built and blown in in 1867 and rebuilt in 1877; No. 4, 70 x 15, built in 1874-5 and blown in in 1876; No. 5, 70 x 16, built in 1874-5 and blown in in 1877; No. 6, 70 x 16, built in 1881 and blown in in 1883; Nos. 2, 4, 5, and 6 are equipped with twelve Siemens-Cowper-Cochrane stoves; the other has iron stoves. Fuel, anthracite coal and Connellsville coke; product, Bessemer pig iron from local and foreign hematite and magnetic ores; total annual capacity, 225,000 gross tons. Foundations for Furnace No. 8 laid in 1892; work suspended. (No. 7 Furnace, (Bingen,) 65 x 16, built in 1870, abandoned in 1897.)—*Active in 1898. See Rolling Mills and Steel Works in Eastern Pennsylvania.*

Carbon Iron Works, Carbon Iron and Steel Company Limited, Mauch Chunk. Works at Parryville, Carbon county. One stack, 66 x 15, built in 1869 and blown in in 1870; rebuilt in 1894-5; three 18-foot Cowper-Foote brick stoves; fuel, anthracite coal and coke; ores, hematite from Lehigh, Northampton, and Carbon counties, magnetic from New Jersey and Lake Champlain, and Lake Superior and foreign; annual capacity, 38,000 gross tons. Product, "Carbon" foundry iron, "Parry" Bessemer iron, and "Viking" low-phosphorus iron. (One stack, built in 1855, dismantled in 1893, and one stack, built in 1864, dismantled in 1894.) M. S. Kemmerer, Chairman, and H. A. Butler, Secretary and Treasurer, Mauch Chunk. Sales made by the company.—*Active in 1897.*

Coleraine Iron Works, Estate of William T. Carter, deceased, Redington, Northampton county. Two stacks, each 60 x 17, built in 1869 and 1872 and rebuilt in 1891-2; two hot-blast stoves; fuel, anthracite coal; ores, ⅝ hematite and ⅔ magnetic from Pennsylvania, New Jersey, and the Lake Superior region; product, foundry pig iron; total annual capacity, 40,500 gross tons. Brand, "Coleraine." For sale or lease. Address the Fidelity Insurance, Trust, and Safe Deposit Company, 327 Chestnut st., Philadelphia.—*Idle since 1893.*

Crane Iron Works, Catasauqua, Lehigh county. Four stacks: two 75 x 17 and two 60 x 16. Original furnaces were built in 1839, 1842, and 1846; first iron made on July 4, 1840; present furnaces built in 1850, 1867, and 1881; one has iron stoves and three have Whitwell stoves; fuel, anthracite coal and coke; ores, New Jersey magnetic, Pennsylvania hematite, Lake Superior, and foreign; specialties, found-

- ry, basic open-hearth, and Bessemer pig iron; total annual capacity, 135,000 gross tons. Brands, "Crane" and "Crane L. P." Leonard Peckitt, President and General Manager; James M. Hodge, Secretary and Treasurer. Selling agents for New York and New England, J. W. Quincy & Co., 98 William st., New York; for Philadelphia and vicinity, Pilling & Crane, Girard Building, Philadelphia.—*Active in 1898.*
- Crumwold Furnace, Reading Iron Company, Reading. Furnace at Emaus, Lehigh county. One stack, 66 x 16, completed and first put in blast October 10, 1872; rebuilt in 1879–80; remodeled in 1890 and equipped with three 60 x 18 Gordon-Whitwell-Cowper fire-brick stoves; fuel, anthracite coal and coke; ores, New York and New Jersey magnetic and Lake Superior; product, foundry and forge pig iron; annual capacity, 45,000 gross tons. (Formerly called Emaus Furnace.) Albert Broden, Superintendent.—*Idle since 1893. See Keystone Furnaces, Schuylkill Valley. See Reading Iron Company and Reading Rolling Mill in Eastern Pennsylvania and Montour Rolling Mills in Central Pennsylvania.*
- Durham Iron Works, Cooper & Hewitt, Riegelsville, Bucks county. New York office, 17 Burling Slip. One stack, 75 x 19, built in 1874 and first blown in in February, 1876; six Cooper-Durham iron stoves; fuel, anthracite coal and Connellsville coke; ores, local hematite and magnetic, New Jersey magnetic, and foreign; specialties, gray forge and Bessemer pig iron; iron actually made in one calendar year, 38,525 gross tons. Brand, "Durham." B. F. Fackenthal, Jr., General Superintendent. Selling agents, J. Tatnall Lea & Co., Stephen Girard Building, Philadelphia.—*Idle since 1892. See Pequest Furnace, New Jersey.*
- Glendon Iron Works, Glendon Iron Company, Easton, Northampton county. Principal office, 60–62 Devonshire st., Boston, Mass. Established in 1843. Furnaces situated at Glendon, near Easton. Two stacks, No. 2 and No. 3, each 81 x 18. Original furnaces were first blown in in 1844, 1845, 1850, and 1869; rebuilt since then and remodeled in 1880, 1882, 1888, 1889, and 1890; fuel, anthracite coal and coke; ores, hematite from Northampton county, Pa., and the Lake Superior region and magnetic from Morris county, New Jersey; specialties, forge and basic open-hearth pig iron; total annual capacity, 75,000 gross tons. Brand, "Glendon." (No. 4 Furnace, at South Easton, built in 1852, torn down in 1890; Furnace No. 1, built in 1844, and Furnace No. 5, built in 1868, torn down in 1897.) Augustus Lowell, President, and F. C. Gray, Treasurer, Boston; Elmer P. Richards, Agent, Easton. Selling agents, J. Tatnall Lea & Co., Stephen Girard Building, Philadelphia; C. L. Peirson & Co., Boston and New York.—*Active in 1896; idle on March 1, 1898, and for sale.*
- Lehigh Steel and Iron Company, Allentown, Lehigh county. Two stacks: No. 1, 65 x 16, completed July 22, 1869, and rebuilt in 1886;

No. 2, 60 x 15, completed October 21, 1872, and rebuilt in 1888; closed tops and fronts; fuel, anthracite coal and coke; ores, Lehigh county and Lake Superior hematite and New Jersey magnetic; specialty, high-grade foundry pig iron; total annual capacity, 57,000 gross tons. Brand, "Lehigh." W. H. Ainey, President; F. J. Remmel, Secretary.—*Active in 1896.*

Lehigh Zinc and Iron Company, South Bethlehem, Northampton county. Main office, 52 Wall st., New York. One stack, 35 x 9, first put in blast in February, 1882; two Durham stoves; fuel, anthracite coal and coke; product, spiegeleisen from zinc residuum; annual capacity, 5,400 gross tons. Brand, "Lehigh." R. Heckscher, President; C. B. Squier, Treasurer. Sole selling agents, The New Jersey Zinc Company, 52 Wall st., New York.—*Active in 1896.*

Macungie Furnace, Macungie Iron Company, Harrison Building, southwest corner Fifteenth and Market sts., Philadelphia. Furnace at Macungie, Lehigh county. One stack, 56 x 16, completed in 1874 and blown in September 14, 1874; old pattern Kent stoves; fuel, anthracite coal and coke; product, foundry pig iron; annual capacity, 20,000 gross tons. H. K. Hartzell, President; Charles Y. Audenried, Secretary and Treasurer.—*Idle since 1893 and for sale or lease.*

Thomas Iron Works, The Thomas Iron Company, Hokendauqua, Lehigh county. Main office, Easton. Nine stacks, located as follows: four at Hokendauqua; two (Lock Ridge) at Alburtis, Lehigh county; one (Keystone) at Glendon, Northampton county; and two (Saucon) at Hellertown, Northampton county. Of the furnaces at Hokendauqua one stack, No. 1, 80 x 17, was built in 1855 and rebuilt in 1894; two, Nos. 3 and 4, each 65 x 17, were built in 1863; and one, No. 6, 60 x 17, was built in 1873. Of the Lock Ridge Furnaces, at Alburtis, one stack, No. 7, is 60 x 14 and was built in 1867, and one stack, No. 8, is 60 x 16 and was built in 1869. The Keystone Furnace, at Glendon, (No. 9), is 65 x 16, and was first put in blast April 17, 1876. Of the Saucon Furnaces, at Hellertown, one stack, No. 10, 75 x 16, was put in blast March 25, 1868, and was rebuilt in 1894; and No. 11, 60 x 16, was put in blast May 25, 1870. Keystone Furnace (No. 9) has Siemens-Cowper-Cochrane regenerative stoves, and Hokendauqua No. 1 and No. 6 have Taws & Hartman regenerative stoves; all the others, except No. 8, have iron pipe stoves; No. 8, at Alburtis, has Durham iron pipe stoves. Fuel, anthracite coal and occasionally some coke; ores, foreign, Lake Superior, local brown hematite, and New Jersey magnetic; product, foundry, forge, basic open-hearth, and Bessemer pig iron; total annual capacity, 240,000 gross tons. Brand, "Thomas." (No. 5 stack, at Hokendauqua, built in 1873, abandoned in 1897.) B. F. Fackenthal, Jr., President and General Manager, W. H. Hulick, Vice-President, and James W. Weaver, Secretary and Treasurer, Easton, Pa.; David H. Thomas, General Superintendent; S. Nor-

ton, Assistant General Superintendent; Daniel Davis, Superintendent of Lock Ridge Furnaces; Fletcher H. Knight, Superintendent of Keystone Furnace; Horace Boyd, Superintendent of Saucon Furnaces. Sales made by W. R. Thomas, 50 Wall st., New York; Philip E. Wright, 319 Willings alley, Philadelphia; and at the main office of the company, Easton.—*Active in 1898.*

Number of anthracite and mixed anthracite and coke furnaces in the Lehigh Valley: 33 completed stacks and 1 stack projected.

SCHUYLKILL VALLEY—ANTHRACITE, MIXED ANTHRACITE
AND COKE, AND COKE.

Anvil Furnace, Pottstown Iron Company, Pottstown, Montgomery county. One stack, 80 x 17, built in 1867 and blown in in December, 1867; remodeled in 1889; three fire-brick stoves, 75 x 19; fuel, anthracite coal and coke; ores, magnetic and hematite; product, special pig iron consumed by the company in the manufacture of steel; annual capacity, 50,000 gross tons. Brand, "Anvil."—*Idle since 1893. See Rolling Mills and Steel Works in Eastern Pennsylvania, (Pottstown Iron Works.)*

Henry Clay Furnaces, Eckert & Brother, Reading, Berks county. Two stacks, each 57 x 13: one built in 1842 and blown in in August, 1844, and the other built in 1855 and blown in in September, 1856; rebuilt several times; two Gordon-Whitwell fire-brick and three iron stoves; fuel, anthracite coal and coke; ores, hematite and magnetic from Berks and Lebanon counties; product, No. 2 foundry and gray forge pig iron; total annual capacity, 36,000 gross tons. Brand, "Henry Clay." Selling agent, J. J. Mohr, Philadelphia.—*Active in 1898.*

Keystone Furnaces, E. and G. Brooke Iron Company, Birdsboro, Berks county. Two stacks: one, 57 x 15, built in 1871; and one, 66 x 16, built in 1873; three Durham and three Whitwell hot-blast stoves; fuel, anthracite coal and coke; ores, magnetic, with a large mixture of hematite; product, foundry and forge pig iron; total annual capacity, 63,000 gross tons. Brand, "Brooke." N. B. Wittman, Superintendent. (One stack, 50 x 12, built in 1853, dismantled in 1897.) Selling agent, J. J. Mohr, Bullitt Building, Philadelphia.—*Active in 1898. See Rolling Mills and Steel Works (Birdsboro Nail Works) in Eastern Pennsylvania.*

Keystone Furnaces, Reading Iron Company, Reading, Berks county. One completed stack and one stack building. Completed stack, 65 x 14½, built in 1873 and remodeled in 1886; Durham stoves; fuel, anthracite coal and coke; ores, Lake Superior, local hematite, and New York and New Jersey magnetic; product, foundry and mill pig iron; annual capacity, 45,000 gross tons. Building stack, 80 x 17, to be equipped with four Massicks & Crooke 75 x 19½ stoves, and to have an annual capacity of about 75,000 gross tons of foundry and forge

pig iron; company expects to have furnace completed in July or August, 1898. Albert Broden, Superintendent. (One Keystone stack, 50 x 15, built in 1869, and two Reading stacks, each 55 x 14½, built in 1854 and 1873 respectively, abandoned in 1897.)—*Active in 1898. See Crumwold Furnace, Lehigh Valley. See Reading Iron Company and Reading Rolling Mill in Eastern Pennsylvania and Montour Rolling Mills in Central Pennsylvania.*

Leesport Furnace, Leesport Iron Company, Leesport, Berks county. One stack, 58 x 16, built in 1852 and first blown in in 1853; rebuilt in 1871; two Gordon, Strobel & Laureau stoves; fuel, anthracite coal; ores, local hematite and magnetic; specialty, foundry pig iron; annual capacity, 18,000 gross tons. Brand, "Leesport." R. T. Leaf, President, and P. R. Stetson, Secretary and Treasurer, Reading. Selling agent, J. J. Mohr, Bullitt Building, Philadelphia.—*Idle since 1895.*

Norristown Iron Works, Estate of James Hooven, deceased, Norristown, Montgomery county. One stack, 55 x 16, built in 1869 and rebuilt in 1871; closed top; four Player iron stoves; fuel, anthracite coal and coke; ore, principally foreign; product, low-phosphorus pig iron; annual capacity, 25,200 gross tons. Brand, "Acme."—*Idle since 1893 and for sale or lease. See Rolling Mills in Eastern Pennsylvania.*

Pioneer Furnaces, Pottsville Iron and Steel Company, Pottsville, Schuylkill county. Two stacks: No. 2, 60 x 13, built in 1866; and No. 3, 65 x 14, built in 1872; two Player and two Cooper iron stoves; fuel, anthracite coal; ores, foreign, Lake Superior, and New Jersey magnetic; product, Bessemer and mill pig iron; total annual capacity, 40,000 gross tons. Brand, "Pioneer."—*Idle since 1893. See Pottsville Rolling Mills in Eastern Pennsylvania.*

Robesonia Furnace, Robesonia Iron Company Limited, Robesonia, Berks county. One stack, 80 x 18, built in 1855, enlarged in 1873, and rebuilt in 1885; four Whitwell stoves; fuel, coke; ore, Cornwall exclusively; product, Bessemer pig iron; annual capacity, 55,000 gross tons. Brand, "Robesonia." (The old Robesonia Furnace, built in 1792 and rebuilt in 1845, was blown out for the last time in 1874 and dismantled in 1884.) W. C. Freeman, Chairman, Cornwall; William R. White, Secretary, Philadelphia; George R. Taylor, Manager, Robesonia. Selling agents, J. Tatnall Lea & Co., Stephen Girard Building, Philadelphia.—*Active in 1898.*

Sheridan Furnaces, Sheridan Iron Works Limited, lessees, Sheridan, Lebanon county. London office, 3 Clements Lane, Lombard st., E. C. Two stacks: No. 1, 76 x 14½, built in 1862 to use charcoal and changed to anthracite in 1867; iron stoves; No. 2, 75 x 15, built in 1874-5 and rebuilt in 1891; two Ford & Moncur brick stoves; fuel, anthracite coal and coke; ores, Cornwall and Lake Superior; product, principally Bessemer and foundry pig iron; total annual capacity, 56,000 gross tons. Brands, "Sheridan" for Bessemer and "Vul-

can" for soft fluid foundry iron. John S. Kennedy, Manager.—*Active in 1897; expect to blow in about May 15, 1898.*

Swede Furnaces, R. Heckscher & Sons, Swedeland, Montgomery county. Main office, Manhattan Building, Philadelphia. Two stacks: No. 1, 80 x 15½, built in 1850 and rebuilt in 1881, 1887, and 1897; No. 2, 80 x 16½, built in 1890-1; No. 1 has four Durham iron stoves and No. 2 has three Taws & Hartman regenerative stoves, each 70 x 18; fuel, anthracite coal and coke; ores, Lake Superior specular, New Jersey magnetic, and highest grades of foreign low-phosphorus; product, "Swede" standard neutral mill pig iron from native ores, "Swede" Bessemer pig iron from foreign ores, and "Swede" basic open-hearth pig iron; annual capacity: No. 1, 40,000 gross tons; No. 2, 50,000 tons. Brand, "Swede." A. Watters, Superintendent.—*Active in 1898.*

Temple Furnace, Temple Iron Company, Reading. Furnace at Temple, Berks county. One stack, 60' x 15, built in 1867 and rebuilt in 1875; two Durham stoves; fuel, anthracite coal and coke; ores, Lake Superior and local hematite and New Jersey magnetic; specialty, foundry pig iron; annual capacity, 25,000 gross tons. Brand, "Temple." George F. Baer, President; Albert Broden, Manager; F. C. Smink, Treasurer.—*Active in 1898.*

Topton Furnace, Isaac Eckert & Co., lessees, Topton, Berks county. Reading office, 24 North Sixth st. One stack, 70 x 16, built in 1873, remodeled in 1888, and rebuilt in 1892; three Gordon fire-brick stoves; fuel, anthracite coal and coke; ore, Cornwall; product, Bessemer pig iron; annual capacity, 30,000 gross tons. Isaac Eckert, Manager. Iron sold by the company and by J. J. Mohr, Bullitt Building, Philadelphia. Isaac Eckert and the Estate of Henry S. Eckert, owners.—*Active in 1896.*

Warwick Furnace, Warwick Iron Company, Pottstown, Montgomery county. One stack, 70 x 16, built in 1875 and first blown in in April, 1876; enlarged to present size in 1889; three 20 x 60 Kennedy fire-brick stoves; fuel, ¾ anthracite coal and ¼ coke; ores, New Jersey and New York magnetites and Lake Superior; specialties, Lake ore foundry and neutral mill pig iron; annual capacity, 65,000 gross tons. Brand, "Warwick." Edgar S. Cook, President; V. P. McCulley, Secretary; Jacob Fegely, Treasurer. Selling agents: for mill iron exclusively without regard to territory and for foundry iron in Philadelphia and its immediate vicinity, J. Wesley Pullman, 238 South Third st., Philadelphia; for foundry iron only without restriction as to territory, C. R. Baird & Co., Philadelphia; for foundry iron in New England, C. L. Peirson & Co., Boston.—*Active in 1898.*

Wellman Furnace, Thurlow, Delaware county. One stack, 70 x 17, first blown in in November, 1881; rebuilt in 1892; three Whitwell stoves; fuel, anthracite coal and coke; ore, foreign; product, Bessemer pig iron; annual capacity, 40,000 gross tons. (Formerly called Chester

Furnace.) Owned by the second mortgage bondholders of the Wellman Steel Company, who are represented by Samuel A. Crozer, of Upland, Delaware county, Pa.—*Idle since 1893 and for sale. See Wellman Steel Works in Eastern Pennsylvania.*

Number of anthracite, mixed anthracite and coke, and coke furnaces in the Schuylkill Valley: 19 completed stacks and 1 stack building.

UPPER SUSQUEHANNA VALLEY—MIXED ANTHRACITE AND COKE.

Lackawanna Furnaces, Lackawanna Iron and Steel Company, Scranton, Lackawanna county. New York office, 52 Wall st. Four stacks: two built in 1849, one in 1854, and one in 1872; No. 1, 80 x 17; No. 2, 75 x 16½; No. 3, 75 x 16½; No. 4, former size 75 x 18½, out of blast, lining removed, and size undecided; two fire-brick and two iron stoves; fuel, anthracite coal and coke; ores, Cornwall, magnetic from Lake Champlain and Putnam county, N. Y., and some Lake Superior; product, Bessemer pig iron; total annual capacity, 180,000 gross tons. Brand, "Lackawanna." (One stack, 75 x 18, built in 1852, abandoned in 1895.) A. H. Lee, Superintendent of Furnaces.—*Two furnaces active in 1898. See Furnaces in the Lower Susquehanna Valley. See Rolling Mills and Steel Works in Central Pennsylvania.*

North Branch Furnace, The North Branch Steel Company, Danville, Montour county. Philadelphia office, Twenty-fifth st. and Washington ave. One stack, 60 x 16, built in 1869 and remodeled in 1884; two nests of Grove iron stoves, each containing six stoves; fuel, anthracite coal and coke; ores, soft fossil, mined in Montour county, and hematite and magnetic from New York, New Jersey, and Lake Superior; product, foundry and mill pig iron; annual capacity, 27,000 gross tons. (One stack, 42½ x 14, built in 1867, abandoned in 1897.)—*Idle since 1892. See North Branch Steel Works in Central Pennsylvania.*

Number of mixed anthracite and coke furnaces in the Upper Susquehanna Valley: 5 stacks.

LOWER SUSQUEHANNA VALLEY—COKE AND MIXED ANTHRACITE AND COKE.

Aurora Furnace, Steacy and Denney Company, Wrightsville, York county. Main office, York. One stack, 65 x 14½, built in 1867, rebuilt in 1874, and remodeled in 1886-7 and in 1891-2; two Whitwell stoves; fuel, anthracite coal and coke; ores, native, from York, Lancaster, and Lebanon counties; product, neutral forge and foundry pig iron; annual capacity, 30,000 gross tons. Brand, "Aurora."—*Idle for several years. See York Rolling Mill in Central Pennsylvania.*

Chickies Furnaces, Chickies Iron Company, (successor to E. Haldeman & Co.) Chickies, Lancaster county. Two stacks: No. 1, 65 x 12, rebuilt in 1887; original stack built in 1845 and blown in January 15,

1846; No. 2, 66 x 12, rebuilt in 1889; original stack built in 1854 and blown in in 1855; iron stoves; fuel, anthracite coal and coke; ore, magnetic from Cornwall, Lebanon county; product, mill and Bessemer pig iron; total annual capacity, 33,500 gross tons. Brand, "Chickies." C. Ross Grubb, President; Horace L. Haldeman, Secretary, Treasurer, and Superintendent.—*Active in 1898.*

Lackawanna Iron and Steel Company, Scranton. New York office, 52 Wall st. Five furnaces at Lebanon, Lebanon county, two owned by the company and three leased. Colebrook Furnaces, two stacks, owned by the company: No. 1, 81½ x 18, built in 1881, remodeled in 1887, and rebuilt in 1895; No. 2, 85 x 18, completed in November, 1882; Whitwell stoves. Bird Coleman Furnaces, two stacks, leased from the Cornwall Iron Company Limited: No. 1, 75 x 18, built in 1872-3 and rebuilt in 1885; No. 2, 75 x 18, built in 1879 and rebuilt in 1885; Whitwell stoves. North Cornwall Furnace, leased from the heirs of Mrs. M. C. Freeman, one stack, 80 x 18, built in 1872 and rebuilt in 1890; Whitwell stoves. Fuel, coke; ore, Cornwall; product, principally Bessemer pig iron; total annual capacity of the five furnaces, 260,000 gross tons. Brand, "Lackawanna." (Cornwall Anthracite Furnaces, at Cornwall, owned by the Lackawanna Iron and Steel Company, two stacks: No. 1, 38 x 12, built in 1854, and No. 2, 38 x 13, remodeled in 1885 and in 1889, abandoned and dismantled.) F. L. Grammer, Superintendent.—*Five furnaces active in 1898. See Lackawanna Furnaces, Upper Susquehanna Valley. See Rolling Mills and Steel Works in Central Pennsylvania.*

Lebanon Furnaces, B. D. and E. R. Coleman, Managers, Lebanon, Lebanon county. Two stacks: No. 1, 80 x 18, built in 1845 and rebuilt in 1868 and in 1885; No. 3, 65 x 15, built in 1872-3 and put in blast in August, 1873; three Whitwell and three 2-pass Cowper stoves; fuel, anthracite coal and coke; ore, Cornwall; product, Bessemer pig iron; total annual capacity, 80,000 gross tons. Owned by the Estate of Mrs. Debbie B. Coleman, deceased.—*Active in 1898.*

Lebanon Valley Furnace, J. & R. Meily, Lebanon, Lebanon county. One stack, 60 x 13, built in 1867, blown in December 23, 1867, and remodeled in 1884; two Whitwell stoves; fuel, anthracite coal and coke; ore, principally Cornwall; specialty, red-short gray forge pig iron; annual capacity, 20,000 gross tons. Brand, "Lebanon Valley."—*Active in 1898.*

Paxton Furnaces, The Paxton Iron and Steel Company, 223 Market st., Harrisburg, Dauphin county. Two stacks: one, 75 x 14, built in 1855 and rebuilt in 1886; and one, 80 x 14, built in 1872 and raised to present height in 1896; six Whitwell stoves; fuel, anthracite coal and coke; ores, various kinds; product, foundry, mill, Bessemer, and basic open-hearth pig iron; total annual capacity, 70,000 gross tons. Brands, "Paxton" and "Silver Spring." Henry McCormick, Presi-

dent; J. M. Cameron, Vice-President; Donald McCormick, Secretary and Treasurer.—*Active in 1898. See Harrisburg Nail Works in Central Pennsylvania.*

Pennsylvania (The) Steel Company, Steelton, Dauphin county. Office, 312-19 Girard Building, Broad and Chestnut streets, Philadelphia. Five stacks, four owned and one leased, four at Steelton and one at Harrisburg, all in Dauphin county: No. 1, 60 x 14, built in 1872-3, put in blast in October, 1873, remodeled in 1883, and supplied with two Whitwell stoves. No. 2, 80 x 20, built in 1874-6, put in blast in June, 1876, remodeled in 1877, and supplied with three Whitwell stoves. Nos. 3 and 4, each 70 x 18; No. 3 first put in operation in February, 1884, and No. 4 first put in operation in April, 1884; each has three Whitwell stoves. Lochiel Furnace, 65 x 14, at Harrisburg, leased from the Lochiel Furnace Company; built in 1872, first put in blast in April, 1873, and remodeled in 1886; three Whitwell stoves. Fuel, anthracite coal and coke; ores, foreign and domestic hematite and magnetite; product, Bessemer and basic open-hearth pig iron and spiegeleisen; total annual capacity, 300,000 gross tons. John W. Dougherty, Superintendent of Furnaces.—*Active in 1898. See Pennsylvania Steel Works in Central Pennsylvania.*

Swatara Furnace, The McCormick Estate, 223 Market st., Harrisburg. Furnace at Union Deposit, Dauphin county. One stack, 50 x 11, built in 1854 and remodeled in 1880; one iron pipe oven; fuel, anthracite coal and coke; ores, magnetite, brown hematite, and fossil from Lebanon, Dauphin, and Juniata counties; product, gray forge pig iron; annual capacity, 18,000 gross tons. (Formerly called Union Deposit Furnace).—*Idle since 1887.*

Vesta Furnace, Columbia Rolling Mill Company, Columbia. Furnace at Vesta, Lancaster county. One stack, 65 x 14, built in 1868, rebuilt in 1881, and remodeled in 1886 and 1890; two Whitwell stoves; fuel, anthracite coal and coke; ores, hematite and magnetite; product, neutral forge and foundry pig iron; annual capacity, 25,000 gross tons. Brand, "Vesta."—*Idle since 1893. See Columbia Rolling Mill Company in Central Pennsylvania.*

Number of coke and mixed anthracite and coke furnaces in the Lower Susquehanna Valley: 20 stacks.

JUNIATA VALLEY—COKE AND MIXED ANTHRACITE AND COKE.

Bellefonte Furnace, Thomas A. Shoemaker & Co., lessees, Bellefonte, Centre county. One stack, 70 x 16, built in 1887 and put in blast February 1, 1888; three Whitwell stoves; fuel, coke; ore, native hematite; product, foundry and forge pig iron; annual capacity, 30,000 gross tons. Thomas A. Shoemaker, Superintendent. Owned by the Bellefonte Furnace Company, Bullitt Building, Philadelphia.—*Idle since 1893.*

Emma Furnace, Logan Iron and Steel Company, Lewistown, Mifflin county. Telegraph address, Burnham. Philadelphia office, Harrison Building, southwest corner Fifteenth and Market sts. One stack, 54 x 10½, built in 1867; formerly operated with charcoal but enlarged in 1879 to be run with coke; remodeled in 1888 and in 1893; one Durham iron pipe stove; ores, Lake Superior red hematite, carbonate, and red fossiliferous; product, gray forge pig iron; annual capacity, 12,000 gross tons. Brand, "Emma." R. H. Lee, Superintendent.—*Active in 1896. See Greenwood (charcoal) Furnace in Pennsylvania. See Logan Iron and Steel Works in Central Pennsylvania.*

Everett Furnace, Joseph E. Thropp, Everett, Bedford county. Philadelphia office, 119 South Fourth st. One stack, 75 x 17, built in 1883-4 and first blown in December 9, 1884; three Siemens-Cowper-Cochrane stoves; fuel, Broad Top coke from coal mined and coked on the furnace property at Kearney; ores, Juniata fossil and hematite and Lake Superior hematite; fossil and hematite ore mines and limestone quarry are a part of the furnace property; product, soft and strong foundry pig iron; annual capacity, 65,000 gross tons. Brands, "Everett Scotch" and "Everett Strong Foundry." Joseph E. Thropp, Jr., General Manager. General selling agents, Jerome Keeley & Co., 421 Chestnut st., Philadelphia.—*Active in 1897.*

Juniata Furnace, Juniata Furnace and Foundry Company, Newport, Perry county. Philadelphia office, Beach and Marlborough sts. One stack, 60 x 13, built in 1871 and blown in in July, 1872; remodeled in 1888-9; two Durham iron stoves; fuel, anthracite coal and coke; ores, local magnetic, fossil, hematite, and Lake Superior; product, foundry pig iron; annual capacity, 18,000 gross tons. Brand, "Marshall." (Formerly called Marshall Furnace.) Alfred Marshall, President; Edward T. Adams, Secretary; J. Howard Marshall, Treasurer; P. Hiestand, Superintendent. Selling agents, Marshall Brothers, Beach and Marlborough sts., Philadelphia.—*Active in 1897.*

Kemble Furnaces, Kemble Iron Company, Riddlesburg, Bedford county. Branch office, 229 Water st., Pittsburgh. Two stacks, each 60 x 13, built in 1868 and 1870; the first was put in blast July 4, 1869, and the second March 4, 1871; four Player stoves; fuel, Broad Top coke; ore, Lake Superior hematite; product, principally a soft, strong, fluid foundry pig iron; total annual capacity, 30,000 gross tons. Brand, "Kemble." Alex. Nimick, President; William H. Connell, Vice-President; Charles H. Scott, Secretary and Treasurer; William Lauder, General Manager. Selling agents, L. & R. Wister & Co., 672 Bullitt Building, Philadelphia; Frank D. Moffat & Co., 81 Fulton st., New York City, for New York and New England.—*Active in 1898.*

Rockhill Furnaces, Rockhill Iron and Coal Company, Rockhill Furnace, Huntingdon county. Telegraph address, Rockhill via Mount Union. Office, 320 Walnut st., Philadelphia. Two stacks, 65 x 17 and 65 x

15, built in 1875 and blown in January 1, 1876; one stack rebuilt in 1886; four hot-blast stoves; fuel, Rockhill coke; ores, $\frac{2}{3}$ soft fossil and $\frac{1}{3}$ hematite from the company's mines and from Shoenberger; specialties, foundry and gray forge pig iron; total annual capacity, 30,000 gross tons. Brand, "Rockhill." William A. Ingham, President; Edward Roberts, Jr., Vice-President; J. E. Haverstick, Secretary and Treasurer; F. F. Lyon, Manager. Sales made by the company.—*Idle since 1893.*

Saxton Furnaces, Saxton Iron Company, Saxton, Bedford county. Main office, Bullitt Building, Philadelphia. Two stacks: No. 1, 70 x 18, built in 1880-1 and blown in October 16, 1882; three Whitwell stoves, each 70 x 18; No. 2, 71 x 17, built in 1886-7 and blown in November 30, 1889; three Whitwell stoves, each 60 x 18; fuel, Broad Top coke; ores, native, from mines on property, and Lake Superior; product, No. 1 foundry pig iron; total annual capacity, 45,000 gross tons. Test of No. 1 pig iron by Baldwin Locomotive Works showed 23,582 pounds' tensile strength per square inch and a shrinkage of $\frac{1\frac{1}{2}}{100}$ of an inch per foot. (Formerly called Powelton Furnaces.) Wm. W. Kurtz, President; Wm. B. Kurtz, Secretary and Treasurer.—*Idle for several years.*

Valentine (The) Iron Company, Bellefonte, Centre county. One stack, 70 x 15, built in 1887 and blown in March, 1888; three Whitwell stoves, 50 x 18; fuel, Connellsville coke; ore, hematite from Centre county; product, foundry pig iron especially adapted for fine machinery castings, builders' hardware, piano plates, and fine stove work; annual capacity, 33,000 gross tons. Brand, "Nittany."—*Active in 1897. See Rolling Mills in Central Pennsylvania.*

Number of coke and mixed anthracite and coke furnaces in the Juniata Valley: 11 stacks.

ALLEGHENY COUNTY—COKE.

Carnegie (The) Steel Company, Limited, general offices, Carnegie Building, Pittsburgh. Seventeen stacks in Allegheny county: Edgar Thomson Furnaces, at Bessemer, two miles from Pittsburgh, on the Pennsylvania, the Baltimore and Ohio, the Pittsburgh and Lake Erie, the Pittsburgh, Bessemer, and Lake Erie, and the Union railroads, and the Monongahela river: nine stacks, four of which were built by the Edgar Thomson Steel Company, Limited, and five by Carnegie Brothers & Co., Limited: Furnace A, 75 x 14 $\frac{1}{2}$, has four fire-brick stoves, each 65 x 15; Furnaces B, 80 x 18, and C, 80 x 16, have eight fire-brick stoves, six 75 x 20 and two 75 x 21; Furnaces D and E, each 80 x 21, have six fire-brick stoves, each 78 x 21, and one fire-brick stove, 78 x 20; Furnaces F and G, each 90 x 21, have seven fire-brick stoves, each 78 x 21; Furnaces H and I, each 90 x 21, have seven fire-brick stoves, each 79 x 21; first blasts: A, January 3, 1880; B, April 4, 1880; C, November 4, 1880; D, April 18, 1882; E,

June 28, 1882; F, October 19, 1886; G, June 21, 1887; H, March 1, 1890; and I, August 17, 1890; fuel, Connellsville coke; ores, Pennsylvania, Lake Superior, and foreign; product, Bessemer and basic pig iron, spiegeleisen, and ferromanganese. Duquesne Furnaces, at Duquesne, four miles from Pittsburgh, on the Pennsylvania and the Union Railroads and the Monongahela river: four stacks: Nos. 1, 2, and 3, each 100 x 22, and No. 4, 100 x 21, have sixteen Kennedy-Cowper stoves, each 97 x 21; first blasts: No. 1, June 8, 1896; No. 2, October 7, 1896; No. 3, May 7, 1897; No. 4, June 21, 1897; fuel, Connellsville coke; ores, Pennsylvania and Lake Superior; product, Bessemer and basic pig iron. Lucy Furnaces, at Fifty-first st., Pittsburgh, on the Allegheny Valley Railroad: built by the Lucy Furnace Company and enlarged by Carnegie, Phipps & Co., Limited; two stacks, each 85 x 20, have eight fire-brick stoves, each 75 x 21; first blasts: No. 1, May 18, 1872; No. 2, September 27, 1877; fuel, Connellsville coke; ores, Pennsylvania and Lake Superior; product, Bessemer, basic, forge, and foundry pig iron. Carrie Furnaces, at Rankin, one-half mile from Pittsburgh, on the Baltimore and Ohio and the Pittsburgh and Lake Erie Railroads: built by the Carrie Furnace Company; two stacks, 90 x 18½; one, removed from Ohio in 1883, blown in February 29, 1884, and rebuilt in 1893; the other, built in 1888-9, blown in July 19, 1889, and rebuilt in 1895; nine Massicks & Crooke stoves, six 90 x 19½ and three 70 x 19½; fuel, Connellsville coke; ore, Lake Superior; product, standard and low-phosphorus Bessemer and basic pig iron. Annual capacity of Edgar Thomson Furnaces, 1,000,000 gross tons; of Duquesne Furnaces, 750,000 tons; of Lucy Furnaces, 250,000 tons; of Carrie Furnaces, 200,000 tons: total, 2,200,000 tons.—*Active in 1898. See Rolling Mills and Steel Works in Allegheny County, Pennsylvania.*

Clinton Furnace, Clinton Iron and Steel Company, 208 Wood st., Pittsburgh. New York office, 15 Cortlandt st. One stack, 72½ x 16, built in 1859 and rebuilt in 1889-90 and in 1893; three C. H. Foote hot-blast stoves; fuel, coke; ore, Lake Superior; product, Bessemer pig iron and an exceedingly soft and fluid foundry iron of rare strength, especially adapted for light work and fine machinery castings; annual capacity, 63,500 gross tons. Brands, "Hector" and "Clinton." Charles W. Friend, Furnace Superintendent.—*Active in 1898. See Clinton Rolling Mill, Allegheny County, Pennsylvania.*

Edith Furnace, Oliver and Snyder Steel Company, German National Bank Building, Pittsburgh. Furnace in Allegheny City. One stack, 75 x 16½, built in 1882 and put in operation in November, 1882; rebuilt in 1891; four Cowper-Kennedy stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 75,000 gross tons. Brand, "Edith." (Formerly operated by the Hainsworth Steel Company.) Building a stack to be 100 x 20 and to have

an annual capacity of 150,000 gross tons of Bessemer pig iron; new stack will also be called "Edith;" when it is completed, about September 1, 1898, the present stack will be abandoned and used as a dust collector; new stack will be equipped with the four Cowper-Kennedy stoves mentioned above and will use Connellsville coke and Lake Superior ore. John Reis, Manager.—*Active in 1898. See Rosena Furnace in the Shenango Valley, Pennsylvania. See Rolling Mills and Steel Works in Allegheny County, Pennsylvania.*

Isabella Furnaces, The Isabella Furnace Company Incorporated, Etna. Three stacks: two, each 75 x 20, built in 1872 and equipped with six 70 x 21 Whitwell stoves; and one, 75 x 16, built in 1890, equipped with three Kennedy stoves; fuel, coke; ore, Lake Superior; product, Bessemer, foundry, and mill pig iron; total annual capacity, 215,000 gross tons. Brand, "Isabella." John W. Chalfant, President; James R. Darragh, Secretary; J. Painter, Jr., Treasurer; Hugh Kennedy, General Manager.—*Active in 1898.*

Laughlin & Co. Limited, Pittsburgh. Four stacks in Pittsburgh, three owned and one leased. Eliza Furnaces, three stacks: one, 75 x 15, built in 1861 and enlarged in 1874 and 1890; one, 80 x 20, built in 1886-7 and blown in in June, 1887; and one, 90 x 21, built in 1888-9 and blown in in May, 1889; twelve Siemens-Cowper stoves. Soho Furnace, leased from the Receiver of the Pittsburgh Steel and Iron Manufacturing Company: one stack, 80 x 19, built in 1872 and first put in blast November 22, 1872; remodeled in 1888; three improved Cowper stoves. Fuel, coke; ore, Lake Superior; product, basic open-hearth and Bessemer pig iron; total annual capacity, 350,000 gross tons. Brand, "Eliza." Henry A. Laughlin, Chairman; James Laughlin, Jr., Secretary and Treasurer.—*Active in 1898. See Rolling Mills and Steel Works in Allegheny County, Pennsylvania, (Soho Iron and Steel Works.)*

Monongahela Furnaces, Department of National Tube Works Company, McKeesport. Two stacks, built in 1889-90: Furnace A, 80 x 20, blown in December 1, 1890; Furnace B, 80 x 19, blown in June 1, 1891; seven Cowper-Kennedy stoves, each 79½ x 21; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; total annual capacity, 240,000 gross tons. Brand, "Monongahela." William B. Schiller, Manager; Taylor Alderdice, Superintendent of Blast Furnaces.—*Active in 1898. See Rolling Mills and Steel Works in Allegheny County, Pennsylvania, (National Tube Works Company and Republic Iron Works.)*

Shoenberger Steel Company, Blast Furnace Department, Pittsburgh. Two stacks: one 75 x 14 and one 75 x 16, built in 1865 and rebuilt in 1890; seven Massicks & Croke stoves; fuel, coke; ore, Lake Superior; product, gray forge, Bessemer, and basic pig iron; total annual capacity, 130,000 gross tons. J. Ramsey Speer, Furnace Super-

intendent. (Formerly called Shoenberger Furnaces.)—*Active in 1898. See Rolling Mills and Steel Works in Allegheny County, Pennsylvania.*
 Number of coke furnaces in Allegheny county: 30 completed stacks and 1 stack building.

SHENANGO VALLEY—COKE.

- Alice Furnace, Pickands, Mather & Co., Cleveland, Ohio. Furnace at Sharpsville, Mercer county. One stack, 70 x 14, built in 1868, put in operation in October, 1868, remodeled in 1882 and 1890, rebuilt in 1894, and again remodeled in 1897; four iron pipe stoves; fuel, coke; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 73,000 gross tons. Brand, "Alice." (Formerly operated by the Wheeler Furnace Company.) Charles I. Rader, Superintendent. Selling agents, Pickands, Mather & Co., Cleveland.—*Active in 1898.*
- Atlantic Furnaces, Atlantic Iron and Steel Company, New Castle, Lawrence county. Two alternate stacks, each 75 x 16, originally built in 1868; one rebuilt in 1882-3 and one rebuilt in 1886; four Whitwell stoves, each 65 x 18, added in 1889; fuel, coke; ore, Lake Superior; product, Bessemer and gray forge pig iron; total annual capacity, 72,000 gross tons. Brand, "Etna." (Formerly called Etna Furnaces.)—*Active in 1898. See Rolling Mills in Western Pennsylvania.*
- Claire Furnace Company Limited, Sharpsville, Mercer county. Branch office with M. A. Hanna & Co., Cleveland, Ohio. One stack, 75 x 16, built in 1869 and rebuilt in 1886 and 1893; four brick stoves; fuel, coke; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 80,000 gross tons. M. A. Hanna, Chairman; Samuel W. Folsom, Treasurer; A. M. Robbins, Secretary and General Manager, all at Cleveland; J. W. Robbins, Superintendent, Sharpsville. Selling agents, M. A. Hanna & Co., Cleveland.—*Active in 1898.*
- Douglas Furnaces, Corrigan, McKinney & Co., lessees, Sharpsville, Mercer county. General office, 716-19 Perry-Payne Building, Cleveland, Ohio. Two alternate stacks: one stack, 60 x 14, built in 1870, put in blast in March, 1871, and rebuilt and enlarged in 1879; the other stack, 60 x 15, built in 1872, put in blast in February, 1873, and enlarged in 1881; iron stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, neutral foundry, and forge pig iron; total annual capacity, 45,000 gross tons. Brand, "Douglas." Selling agents, Corrigan, McKinney & Co., Cleveland; Rogers, Brown & Co., Boston, New York, Buffalo, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis.—*Active in 1896. See Charlotte Furnace, Western Pennsylvania.*
- Ella Furnace, Trustees of Nimick & Co., 229 Water st., Pittsburgh. Furnace at West Middlesex, Mercer county. One stack, 70 x 14, built and blown in in 1882; remodeled in 1892; iron stoves; fuel, Connellsville coke; ore, Lake Superior; product, principally Besse-

mer pig iron; annual capacity, 45,000 gross tons. (Formerly operated by the Wheeler Furnace Company.)—*Active in 1896; idle on March 1, 1898, and for sale or lease.*

Fannie Furnace, Lloyd G. Reed, Erie. Furnace at West Middlesex, Mercer county; post-office address of furnace, Sharon. One stack, 60 x 14, built in 1873 and first blown in October 13, 1873; remodeled in 1885; iron stoves; fuel, coke; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 36,000 gross tons. Brand, "Wheeler." (Formerly operated by the Wheeler Furnace Company.) E. A. Wheeler, Superintendent, Sharon.—*Active in 1896.*

Mabel Furnaces, Perkins & Co. Limited, Sharpsville, Mercer county. Two alternate stacks, each 65 x 15: No. 1 built in 1872 and No. 2 in 1880; both rebuilt in 1883; Pollock iron stoves; fuel, Connellsville coke; ore, Lake Superior; product, foundry, malleable, and Bessemer pig iron; total annual capacity, 70,000 gross tons. Brand, "Mabel." S. Perkins, Jr., Chairman and Manager; L. C. Hanna, Secretary and Treasurer; George D. Devitt, Superintendent. Selling agents, M. A. Hanna & Co., Cleveland.—*Active in 1898.*

Rosena Furnace, Oliver and Snyder Steel Company, German National Bank Building, Pittsburgh. Furnace at New Castle, Lawrence county. One stack, 100 x 20, built in 1872, first put in blast in June, 1873, and rebuilt in 1893; old furnace torn down in 1897 and rebuilt and blown in in the same year; four Massicks & Crooke stoves, each 65 x 18; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 150,000 gross tons. Brand, "Rosena." (Formerly operated by the Rosena Furnace Company.) John Reis, Furnace Manager.—*Active in 1898. See Edith Furnace, Allegheny County, and Rolling Mills and Steel Works, Allegheny County, Pennsylvania.*

Sharon Furnace, Sharon, Mercer county. One stack, 60 x 14, built in 1845 and rebuilt in 1882 and 1891; five iron pipe stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 45,000 gross tons. Brand, "Sharon." Owned by Norman Hall, Sharon, and James Rawle, Philadelphia.—*Active in 1896; idle on March 1, 1898, and for sale or lease.*

Sharon Iron Company Limited, Sharon, Mercer county. Two stacks: one, 72 x 16, built in 1865 and rebuilt in 1887; and one, 72 x 16, built in 1866 and enlarged in 1883; Whitwell stoves; fuel, coke; ore, Lake Superior; specialty, basic open-hearth pig iron; total annual capacity, 73,000 gross tons. Brand, "Shenango."—*Active in 1898. See Rolling Mills in Western Pennsylvania.*

Sharpsville Furnace, Sharpsville Furnace Company, (not incorporated,) Sharpsville, Mercer county. One stack, built in 1847 and torn down in 1882; new iron stack, 65 x 15, blown in October 15, 1882; three iron stoves; fuel, coke; ore, Lake Superior; product, Bessemer, foundry, and red-short mill pig iron; annual capacity, 60,000 gross tons.

Brand, "Sharpsville." Frank Pierce, Secretary and Treasurer; James B. Pierce, General Manager.—*Active in 1898.*

Shenango Valley Steel Company, New Castle, Lawrence county. Three stacks, all at New Castle. Neshannock Furnace, (formerly operated by the Crawford Iron and Steel Company,) one stack, 78 x 18½, built in 1872; first put in operation December 1, 1872; remodeled in 1883; four Whitwell stoves, three 60 x 17 and one 60 x 18, and one improved Massicks & Crooke stove, 75 x 19½. Shenango Furnaces, (formerly called the Norway Furnaces and operated by The Norway Iron and Steel Company,) two alternate stacks, each 80 x 17¾; one, built in 1872 and put in blast in May, 1872, entirely rebuilt in 1891; and one built in 1889 and put in blast September 6, 1889; three Cowper stoves. Fuel, coke; ore, Lake Superior; product, Bessemer pig iron consumed by the company in its steel works; annual capacity: Neshannock Furnace, 115,000 gross tons; Shenango Furnaces, 90,000 tons for each stack. Brands, "Neshannock" and "Shenango."—*Active in 1898. See Shenango Valley Steel Company in Western Pennsylvania. See Shenango Valley Tinplate Works in Pennsylvania.*

Spearman Furnace, The Spearman Iron Company, Sharpsville, Mercer county. One stack, 76 x 17, built in 1895 and blown in September 1, 1895; four Whitwell stoves, 60 x 18; fuel, Connellsville coke; ore, Lake Superior; product, foundry and Bessemer pig iron; annual capacity, 72,000 gross tons. Brand, "Spearman." (Two alternate stacks, built in 1872, abandoned and dismantled.) Joseph Forker, President; John Phillips, 1st Vice-President; Walter Pierce, 2d Vice-President; J. J. Spearman, Treasurer and Manager; M. H. Henderson, Secretary. Sales made by the company.—*Active in 1898.*

Stewart Furnace, Stewart Iron Company Limited, Sharon, Mercer county. One stack, 75 x 16, built in 1872, enlarged in 1883, and rebuilt in 1892; three Kennedy-Cowper fire-brick stoves, 70 x 18; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, low-phosphorus, foundry, and gray forge pig iron; annual capacity, 82,000 gross tons. Brand, "Stewart." (One stack, 66 x 13, built in 1870 and enlarged in 1882, dismantled in 1896. Formerly called Valley Furnaces.) S. McClure, Agent and General Manager. Sales made by H. H. Brown, Treasurer, Cleveland, Ohio.—*Active in 1898. See Rolling Mills in Western Pennsylvania, (Stewart Iron Works.)*

Number of coke furnaces in the Shenango Valley: 20 stacks.

WESTERN PENNSYLVANIA—MISCELLANEOUS COKE.

Cambria Iron Company, Harrison Building, southwest corner Fifteenth and Market sts., Philadelphia. Works at Johnstown, Cambria county. Six stacks: Nos. 1, 2, 3, and 4 were built in 1853 and 1854; No. 1, 76 x 20, was rebuilt in 1883 and 1895; No. 2, 76 x 18, was rebuilt in 1883, 1891, and 1896; No. 3, 76 x 20, was rebuilt in 1886 and 1894;

No. 4, 76 x 18, was rebuilt in 1886 and 1892 ; No. 5, 96 x 21, called also Centennial Furnace, was built in 1873-6, blown in December 22, 1876, and rebuilt in 1890 and 1896-7 ; No. 6, 76 x 20 $\frac{3}{4}$, was first blown in July 20, 1879, and rebuilt in 1893 and 1896. The furnaces are equipped with twenty Whitwell stoves. Fuel, Connellsville coke ; ores, Menominee and Mesabi hematite and native and foreign manganiferous ; specialties, Bessemer and basic open-hearth pig iron, spiegeleisen, and ferromanganese ; total annual capacity, 480,000 gross tons.—*Active in 1898. See Rolling Mills and Steel Works in Western Pennsylvania.*

Charlotte Furnace, Corrigan, McKinney & Co., lessees, Scottdale, Westmoreland county. General office, 716-19 Perry-Payne Building, Cleveland, Ohio. One stack, 65 x 18, built in 1872-3 and put in blast October 14, 1873 ; iron stoves ; fuel, Connellsville coke ; ore, Lake Superior ; product, Bessemer and foundry pig iron ; annual capacity, 70,000 gross tons. Brand, "Charlotte." Selling agents, Corrigan, McKinney & Co., Cleveland ; Rogers, Brown & Co., Boston, New York, Buffalo, Cincinnati, Cleveland, and Chicago ; Rogers, Brown & Warner, Philadelphia and Pittsburgh ; Rogers, Brown & Meacham, St. Louis. Owned by the National Foundry and Pipe Works Limited.—*Active in 1896. See Douglas Furnaces, Shenango Valley.*

Dunbar Furnaces, Dunbar Furnace Company, Dunbar, Fayette county. Two stacks : Furnace No. 1, 77 x 19, built in 1790 and rebuilt in 1870, 1876, and 1880 ; four Whitwell stoves, three 50 x 18 and one 50 x 22. Furnace No. 2, 78 x 17, first put in blast in May, 1880, and remodeled in 1896-7 ; three Whitwell stoves, 60 x 18. Fuel, Connellsville coke ; ore, Lake Superior specular, with a small quantity of mill cinder to insure free working ; product, mill, foundry, basic, car-wheel, and malleable pig iron, strong and of dark color ; also some Bessemer pig iron ; total annual capacity, 110,000 gross tons. Furnace No. 1 will probably be rebuilt and capacity increased. Frank A. Hill, President, C. H. Kimball, Treasurer, and H. R. Hall, Assistant General Manager, Dunbar ; W. C. Harris, Vice-President and Secretary, Bullitt Building, Philadelphia. L. & R. Wister & Co., general sales agents, Bullitt Building, Philadelphia ; A. H. Childs, agent, Pittsburgh.—*Active in 1898.*

Emporium Furnace, Sinnemahoning Iron and Coal Company, Emporium, Cameron county. One stack, 75 x 16, built in 1887-8 and blown in in November, 1888 ; three Siemens-Cowper stoves, each 70 x 18 ; fuel, coke ; ore, brown hematite ; product, foundry pig iron ; annual capacity, 36,000 gross tons. Iron-ore and coal mines and coke ovens belong to the property. (Formerly called Cameron Furnace.) E. M. Parrott, President, and H. H. Schenck, Secretary, 43 Wall st., New York.—*Idle for several years and for sale or lease.*

Punxy Furnace, Punxsutawney Iron Company, Punxsutawney, Jeffer-

son county. One stack, 80 x 17, built in 1896-7 and blown in September 29, 1897; three 80 x 18 Kennedy centre-combustion stoves; fuel, Walston coke; ores, Lake Superior hematite and specular; product, foundry and forge pig iron; annual capacity, 85,000 gross tons. Brand, "Punxy." William A. Rogers, President, and J. G. Munro, Treasurer, Erie County Bank Building, Buffalo, New York; Adrian Iselin, Jr., Vice-President, New York City; Robert Kelly, Secretary, and John H. Kennedy, Superintendent, Punxsutawney. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis.—*Active in 1898.*

Rebecca Furnace, Kittanning Iron and Steel Manufacturing Company, Kittanning, Armstrong county. One stack, 65 x 14½, first put in blast June 20, 1880; three Massicks & Crooke stoves; fuel, coke; ores, native and Lake Superior; product, forge and foundry pig iron; annual capacity, 55,000 gross tons. Brands, "Kittanning" and "Rebecca."—*Active in 1898. See Rolling Mills in Western Pennsylvania.*

Number of coke furnaces in Western Pennsylvania outside of Allegheny county and the Shenango Valley: 12 stacks.

CHARCOAL.

Berlin Iron Works, Gleniron, Union county. One stack, 35 x 8, built in 1827; abandoned in 1856; revived in July, 1880; cold blast; ores, hematite and fossil; product, car-wheel and malleable pig iron; annual capacity, 2,500 gross tons. B. F. Crispin and F. R. Jackson, Berwick, and H. O. Silkman, Maplewood, owners.—*Idle for several years and for sale.*

Boiling Springs Iron Company, Boiling Springs, Cumberland county. One stack, 30 x 9, built in 1798 by Michael Ege and rebuilt in 1815; cold blast; water-power; ore, foreign as a basis; specialties, pig iron low in sulphur and phosphorus, having a tensile strength of from 33,000 to 40,000 pounds, and pig iron for car-wheels and chilled rolls; annual capacity, 3,000 gross tons. Brand, "Boiling Springs." (Company formerly called South Side Iron Company Limited. Furnace formerly known as Carlisle Iron Works.) Owned and operated by J. C. Bucher.—*Idle since 1894.*

Chestnut Grove Furnace, John C. Long, Carlisle. Furnace at Idaville, Adams county. One stack, 32 x 8½, built in 1830; cold blast; open top; ores, magnetite and hematite from the neighborhood; product, strictly cold-blast pig iron for car-wheels, chilled rolls, malleable castings, and open-hearth steel; annual capacity, 1,500 gross tons. Brand, "Chestnut Grove C. B."—*Idle for several years.*

Falling Spring Furnace, Bonbrake, Burkhart & Co., Chambersburg, Franklin county. One stack, 40 x 8½, built in 1880 and remodeled in 1883-4; cold or warm blast; ore, local hematite; specialty, car-wheel

pig iron; annual capacity, 3,000 gross tons. Brand, "Falling Spring."
—*Idle since 1892.*

Greenwood Furnace, Logan Iron and Steel Company, Lewistown, Mifflin county. Philadelphia office, Harrison Building, southwest corner Fifteenth and Market sts. Works at Greenwood, Huntingdon county. One stack, 46 x 8, built in 1864; remodeled in 1889; cold blast; ore, red fossiliferous obtained in the vicinity; product, pig iron for car-wheels and chilled rolls; annual capacity, 3,200 gross tons. Brand, "Greenwood." William Craig, Superintendent.—*Active in 1898. See Emma Furnace, Juniata Valley, Pennsylvania. See Logan Iron and Steel Works in Central Pennsylvania.*

Hecla Furnace, McCoy & Linn, Milesburg, Centre county. One stack, 32 x 8½, built in 1864; cold blast; water-power; open top; ore, hematite from Nittany Valley; product, forge and foundry pig iron; annual capacity, 1,800 gross tons. (Old Hecla Furnace, built in 1820, abandoned in 1864.)—*Active in 1896. See Rolling Mills in Central Pennsylvania, (Milesburg Iron Works.) See Bloomeries in Pennsylvania.*

Isabella Furnace, William M. Potts, Wyebrooke, Chester county. One stack, 60 x 7¾, built in 1835 and rebuilt in 1864, 1881, and 1886; cold blast; product, car-wheel pig iron made from magnetic and hematite ores mined in Lancaster and Chester counties, with a mixture of foreign and Lake Superior ores; annual capacity, 5,400 gross tons. Brand, "Wyebrooke."—*Idle since 1894 but in good condition.*

Jefferson Furnace, J. M. Kaufman, Auburn, Schuylkill county. Furnace at Jefferson Station, same county. One iron stack, 33 x 8, first put in blast May 20, 1880; cold blast; ore, hematite from Berks and Lehigh counties; specialty, pig iron for car-wheels and heavy rolls; annual capacity, 2,300 gross tons.—*Idle for several years and for sale.*

Joanna Furnace, L. Heber Smith, Joanna Furnace, Berks county. One stack, 45 x 8¾, built in 1792 by Potts & Rutter and rebuilt in 1847; remodeled in 1889; hot or cold blast; Weimer blowing engine; bell and hopper top; ores, local magnetite and hematite; specialty, car-wheel pig iron; annual capacity, 4,000 gross tons. Brand, "Joanna." Selling agent, J. J. Mohr, Bullitt Building, Philadelphia.—*Idle since 1895.*

Maiden Creek Furnace, Jacob K. Spang, Lenhartsville, Berks county. One stack, 33 x 9, built in 1854; equipped for hot blast in 1890; closed top; warm blast; ores, Moselem hematite and local magnetite; product, pig iron for car-wheels and chilled rolls; annual capacity, 3,500 gross tons. Brand, "Maiden Creek."—*Idle for several years.*

Mont Alto Furnace, Mont Alto Iron Company, David Knepper, Receiver, Mont Alto, Franklin county. Telegraphic connection with Western Union office at Chambersburg. One stack, 30 x 9, built in 1807-8 and size increased to 45 x 9½ in 1881; burned in April, 1889, and rebuilt in same year to 50 x 10; cold and warm blast;

ore, exclusively brown hematite from the furnace property; product, pig iron for car-wheels, chilled rolls, and best charcoal blooms; annual capacity, 10,800 gross tons. Brand, "Mont Alto." Edward B. Wiestling, General Manager, Secretary, and Treasurer, Chambersburg. Selling agents, L. & R. Wister & Co., Bullitt Building, Philadelphia.—*Idle since 1892. See Bloomaries in Pennsylvania.*

Pine Grove Furnace, South Mountain Mining and Iron Company, Pine Grove Furnace P. O., Cumberland county. One stack, 53 x 9, built in 1770; remodeled in 1877 and 1883; hot blast; ore, hematite from the furnace property; product, forge pig iron for flange, fire-box, and car-wheel iron; annual capacity, 5,000 gross tons. Brand, "Pine Grove." J. C. Fuller, President; William H. Woodward, Treasurer; A. C. Givler, Superintendent.—*Idle since 1895. See Bloomaries in Pennsylvania, (Laurel Forge.)*

Number of charcoal furnaces in Pennsylvania: 12 stacks. Total number of furnaces in Pennsylvania: 162 completed stacks, 2 stacks building, and 1 stack projected.

MARYLAND.

COKE.

Deborah Furnace, Catoctin Mountain Iron Company, Catoctin Furnace P. O., Frederick county. One stack, 50 x 11½, built in 1873-4; two Raymond & Campbell stoves; fuel, Connellsville coke; ore, local hematite; product, mill and foundry pig iron; annual capacity, 9,000 gross tons. Brand, "Catoctin." George Houck, President and Treasurer; Harry P. Gorsuch, Secretary.—*Idle since 1892. See Isabella (charcoal) Furnace in Maryland.*

Maryland Steel Company, Sparrow's Point, Baltimore county. Philadelphia office, Girard Building, Broad and Chestnut sts. Four stacks: Furnaces A, B, C, and D, each 85 x 22; commenced building in August, 1887, and completed in 1889, 1890, and 1891. First blasts: A, October 23, 1889; B, March 11, 1890; C, October 3, 1891; and D, April 15, 1893. Each stack equipped with four Whitwell stoves; fuel, coke from West Virginia, the mountain district of Pennsylvania, and Connellsville, Pa.; ores, hematite from Cuba, Spain, Africa, and Newfoundland; product, Bessemer pig iron; total annual capacity, 358,000 gross tons.—*Active in 1898. See Rolling Mills and Steel Works in Maryland.*

Number of coke furnaces in Maryland: 5 stacks.

CHARCOAL.

Isabella Furnace, Catoctin Mountain Iron Company, Catoctin Furnace P. O., Frederick county. One stack, 32 x 9, built in 1856; cold blast; steam and water power; open top; ore, local hematite; product,

foundry pig iron; annual capacity, 3,300 gross tons. Brand, "Isabella." Selling agents, Miller, Wagoner, Fieser & Co., Columbus, Ohio.—*Idle since 1893. See Deborah (coke) Furnace in Maryland.*

Muirkirk Furnace, Charles E. Coffin, Muirkirk, Prince George county. One stack, 36 x 8½, built in 1847; burned and rebuilt in 1888; warm blast; open top; ore, carbonate, mined in the neighborhood, roasted and crushed before using; product, pig iron for car-wheels, guns, flange iron, and shot and shell; annual capacity, 5,000 gross tons. Brand, "Muirkirk."—*Active in 1897.*

Stickney (The) Iron Company, Baltimore. Office and furnace at Canton, Baltimore county. One stack, Furnace B, 48 x 11, completed and put in blast May 15, 1882; hot blast; ore, Baltimore carbonate; product, pig iron used in the manufacture of malleable iron castings and car-wheels and known as "Stickney" iron; annual capacity, 6,000 gross tons. (One stack, Furnace A, 50 x 9½, built in 1854 and rebuilt in 1871, abandoned and dismantled in 1894.) George H. Stickney, President; Harry Bloodsworth, Secretary; John L. Reed, Treasurer.—*Active in 1896. See Rolling Mills in Maryland. See Tinplate Works in Maryland.*

Number of charcoal furnaces in Maryland: 3 stacks. Total number of furnaces in Maryland: 8 stacks.

VIRGINIA.

COKE.

Alleghany Iron Company, Iron Gate, Alleghany county. Main office, Richmond; New York office, 29 Broadway. Two stacks, one owned by the company and the other leased. Alleghany Furnace, at Iron Gate, one stack, 65 x 13, built in 1891-2 and blown in December 1, 1892; three Taws & Hartman improved Whitwell stoves. Buena Vista Furnace, at Buena Vista, Rockbridge county, leased from the Virginia Development Company, one stack, 70 x 17, built in 1889-90 and blown in December 12, 1890; three Whitwell stoves. Fuel, New River coke; ore, brown from Craig creek; product, foundry pig iron; total annual capacity, 80,000 gross tons. Brand, "Alleghany." F. C. Dininny, Jr., President, New York City; T. C. Jones, Superintendent, Iron Gate, and Meriwether Jones, General Manager, Richmond, Virginia. Selling agents, C. R. Baird & Co., Bullitt Building, Philadelphia.—*Active in 1898.*

Bristol Furnace, Bristol Furnace Company, lessee, Bristol, Tenn. Furnace built on the Virginia side of the State line, in Washington county. One stack, 75 x 17, built in 1890-1; first iron made October 24, 1891; three Whitwell stoves; fuel, Pocahontas coke; ore, Cranberry from North Carolina; product, high-grade Bessemer pig iron; annual capacity, 45,000 gross tons. Brand, "Bristol." Owned by the

Home Iron Company. (Formerly operated by the Bristol Iron and Steel Company.)—*Idle since 1891 but getting ready to blow in.*

Crozer Furnaces, Crozer Iron Company, Roanoke, Roanoke county. General office of the President, Secretary, and Treasurer, Upland, Delaware county, Pa. Two stacks at Roanoke: Furnace A, 70 x 15, built in 1882-3 and first put in operation May 29, 1883; Furnace B, 70 x 14½, built in 1889 and blown in October 19, 1889; six Whitwell stoves; fuel, Pocahontas coke; ore, local hematite; product, foundry and forge pig iron; total annual capacity, 84,000 gross tons. Brand, "Crozer." Samuel A. Crozer, President; John P. Crozer, Treasurer; Francis E. Weston, Secretary. Selling agents for New York and New England, N. S. Bartlett & Co., 60 State st., Boston; for Philadelphia and adjacent territory, Jerome Keeley & Co., Philadelphia Bank Building, 421 Chestnut st., Philadelphia.—*Active in 1898.*

Dora Furnace, Dora Furnace Company, Pulaski City, Pulaski county. One stack, 75 x 17, built in 1891-2 and blown in in May, 1892; three Whitwell stoves; fuel, Tom's creek coke; ores, limonite and hematite from Cripple creek; product, No. 1x foundry pig iron; annual capacity, 50,000 gross tons. Brand, "Dora." John W. Robinson, President; George L. Carter, Vice-President and General Manager; L. S. Calfee, Secretary and Treasurer. Selling agents, Crocker Brothers, 32 Cliff st., New York.—*Active in 1898.*

Gem Furnace, Shenandoah Furnace Company, Shenandoah, Page county. Philadelphia office, Bullitt Building. One stack, 70 x 16, built in 1882 and first blown in February 8, 1883; remodeled in 1889 and again in 1891; three Whitwell stoves; fuel, Pocahontas coke; ore, brown hematite mined on the furnace property; product, foundry and forge pig iron; annual capacity, 36,000 gross tons. Brand, "Shenandoah." David W. Flickwir, President, Roanoke; H. E. Gerhard, Secretary and Treasurer, Philadelphia. Selling agents, Rogers, Brown & Co., Boston, New York, Buffalo, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis.—*Active in 1896.*

Ivanhoe Furnace, New River Mineral Company, Ivanhoe Furnace P. O., Wythe county. Main office, 100 William st., New York. One stack, 70 x 13½, built in 1881-2 to use charcoal and first put in blast in March, 1882; rebuilt to use coke in 1887-8 and blown in January 2, 1889; stack raised in 1893; two Whitwell stoves; fuel, Pocahontas coke; ores, local brown hematite and limonite; product, foundry and forge pig iron; annual capacity, 25,000 gross tons. Brand, "Ivanhoe." George H. Seeley, President, Edwin Einstein, Vice-President, and J. T. Pearson, Secretary and Treasurer, New York; George M. Seeley, General Manager, at the works. Selling agents, N. S. Bartlett & Co., Boston and New York.—*Active in 1898.*

Jennie and Polly Furnaces, The Big Stone Gap Iron Company, Big

Stone Gap, Wise county. One completed stack (Jennie) and one stack not completed, (Polly.) Jennie, 75 x 18, built in 1890-2 and blown in May 4, 1892; three Whitwell stoves; fuel, Pocahontas Flat Top and Wise county (Virginia) coke; ore, local fossil; product, foundry pig iron; annual capacity, 26,000 gross tons. Brand, "B. S. G." Polly, to be 75 x 18, is partly erected, and is to have three Whitwell stoves; work stopped in 1892. (Formerly operated by the Appalachian Steel and Iron Company.) S. Zorn, President; C. T. Ballard, Vice-President; Oscar Fenley, Secretary and Treasurer; R. C. Ballard Thruston, Manager.—*Active in 1896.*

Longdale (The) Iron Company, Longdale, Alleghany county. Two stacks: No. 1, (formerly Lucy Selina,) 59 x 16½, built in 1827 and rebuilt in 1873, 1889, and 1897; No. 2, 60 x 17½, first blown in in February, 1881, and enlarged in 1890; rebuilt in 1897; six iron pipe stoves, three to each furnace; fuel, West Virginia coke; ore, brown hematite mined near the furnace; product, chiefly basic pig iron cast in chills; total annual capacity, 40,000 gross tons. Brand, "Longdale." H. Firmstone, President, and J. E. Johnson, Manager; John L. Wilson, Treasurer, 608 Chestnut st., Philadelphia. Sole sales agents, Matthew Addy & Co., Cincinnati.—*Active in 1898.*

Low Moor Iron Company of Virginia, Low Moor, Alleghany county. Three stacks in Alleghany county. Two stacks at Low Moor: one, 74 x 18, built in 1880, and one, (alternate stack), 80 x 18, built in 1887; seven Whitwell stoves; fuel, New River coke, made at the furnaces in 150 ovens; ore, local brown hematite; product, foundry pig iron; brand, "Low Moor." Covington Furnace, at Covington, one stack, 75 x 18, built in 1891-3 and blown in April 20, 1895; three Gordon-Whitwell-Cowper stoves; fuel, New River coke; ore, native hematite; product, foundry pig iron; brand, "Covington." Total annual capacity, 90,000 gross tons. E. C. Means, President, and Frank Lyman, Vice-President and Treasurer, 31 Burling Slip, New York; Henry G. Merry, General Superintendent, Low Moor. Selling agents: for the West, Thomas A. Mack, Cincinnati; for Eastern New England, C. L. Peirson & Co., Boston.—*Active in 1898.*

Max Meadows Furnace, Max Meadows Iron Company, Max Meadows, Wythe county. Philadelphia office, Bullitt Building. One stack, 75 x 17, built in 1890-1 and first blown in November 19, 1895; three Whitwell stoves; fuel, Pocahontas coke; ore, local brown hematite; product, foundry pig iron; annual capacity, 40,500 gross tons. (Formerly operated by the Pulaski Iron Company.) Logan M. Bullitt, President, and Charles S. Thorne, Secretary and Treasurer, Philadelphia. Selling agent, Frank Samuel, Harrison Building, Philadelphia.—*Active in 1896; idle on March 1, 1898, and for lease.*

Nannie B. Furnace, Reusens, Campbell county, on the Chesapeake and Ohio Railroad. One stack, 65 x 12½, built in 1887-8 and blown in

June 12, 1888; water-power; two iron pipe stoves; fuel, coke; ores, specular and brown hematite; product, foundry pig iron; annual capacity, 15,000 gross tons. Brand, "Virginia."—*Idle for several years. See Rolling Mills in Virginia, (Virginia Nail and Iron Works.)*

Princess Furnace, D. S. Cook, Glen Wilton, Botetourt county. Main office, Wrightsville, Pa. One stack, 60 x 12½, built in 1883-4; four Gordon-Whitwell-Cowper stoves; fuel, New River coke; ore, hematite mined on the furnace property; product, soft, strong, and very fluid foundry pig iron; annual capacity, 15,000 gross tons. Brand, "Princess." T. D. Kauffelt, Manager.—*Active in 1898.*

Pulaski Iron Company, Pulaski City, Pulaski county. Main office, 330 Walnut st., Philadelphia. One stack, 75 x 17, built in 1887 and blown in in February, 1888; three Whitwell stoves; fuel, Pocahontas coke; ores, brown hematite and limonite from the Cripple creek region, Va., and Gossan from the Virginia Mining Company's mines; product, high-grade foundry pig iron; annual capacity, 50,000 gross tons. A. J. Dull, President, Harrisburg, Pa.; E. P. Borden, Vice-President; Abraham S. Patterson, Secretary and Treasurer, Philadelphia; John W. Eckman, General Manager. Selling agents, C. L. Peirson & Co., Boston and New York; L. & R. Wister & Co., Bullitt Building, Philadelphia, for Eastern Pennsylvania, Delaware, and Southern and Eastern New Jersey; C. Price Speer & Brother, Chambersburg, Pa.; Domhoff and Joyce Company, Fourth and Elm sts., Cincinnati.—*Active in 1898.*

Radford-Crane Furnace, Radford-Crane Iron Company, Radford, Montgomery county. Main office, Bullitt Building, Philadelphia. One stack, 75 x 18, begun in 1890 and completed in 1892; not yet blown in; four Whitwell stoves; fuel, Pocahontas coke; ore, Virginia hematite; product, foundry pig iron; annual capacity, 50,000 gross tons. Brand, "Radford-Crane." Logan M. Bullitt, President, and Charles S. Thorne, Secretary and Treasurer, Bullitt Building, Philadelphia.—*Never blown in.*

Roanoke Furnace, Roanoke, Roanoke county. One stack, 82 x 17, built in 1890 and blown in December 1, 1890; four Massicks & Crooke stoves; fuel, Pocahontas coke; ore, brown hematite from Southwest Virginia; product, foundry and forge pig iron; annual capacity, 48,000 gross tons. Brand, "Roanoke." Owned by Robert E. Tod and others, 45 Wall street, New York City.—*Active in 1896; idle on March 1, 1898, and for sale or lease. See Rolling Mills in Virginia, (Roanoke Iron Works.)*

Victoria Furnace, Victoria Furnace Company, Goshen Bridge, Rockbridge county. One stack, 75 x 18, built in 1882-3; first put in blast May 1, 1883; rebuilt in 1892; three Siemens-Cowper-Cochrane stoves; fuel, New River coke; ore, brown hematite; product, foundry and forge pig iron; annual capacity, 50,000 gross tons. Brands, "Rock-

bridge" for foundry and forge and "Goshen" for soft and silvery. (Formerly called Rockbridge Furnace.) Henry D. Turney, President; Decatur Axtell, Vice-President; Vincent Ferguson, Secretary and Treasurer.—*Active in 1896.*

Virginia Development Company, 770 Bullitt Building, Philadelphia. Principal owner of two stacks: Graham Furnace, at Graham, Tazewell county; one stack, 70 x 16, built in 1890 and blown in December 12, 1891; three Whitwell stoves; fuel, Pocahontas coke; ore, local hematite; product, foundry pig iron; annual capacity, 36,000 gross tons; brand, "Graham;" (formerly operated by the Graham Furnace Company.) Salem Furnace, at Salem, Roanoke county; one stack, 75 x 14½, built in 1889-91 and blown in in October, 1891; three Whitwell stoves; fuel, Pocahontas coke; ore, local hematite; product, foundry pig iron; annual capacity, 35,000 gross tons; brand, "Salem;" (formerly operated by the Salem Furnace Company.) Logan M. Bullitt, President, and Charles S. Thorne, Secretary and Treasurer, Philadelphia. Selling agent, Frank Samuel, Harrison Building, Philadelphia.—*Graham Furnace idle since 1892 and for sale or lease; Salem Furnace idle since 1893 and for sale or lease.*

PROJECTED.

Basic City Furnace, Virginia Iron Investment Company, Basic City, Augusta county, Virginia, and Reading, Berks county, Pennsylvania. Foundations laid at Basic City in 1890 for one coke stack, to be 75 x 16; work suspended; may resume building operations in 1898. W. M. Kaufman, President and General Manager; M. H. Leonard, Secretary and Treasurer.

Number of coke furnaces in Virginia: 23 completed stacks, 1 stack partly erected, and 1 stack projected.

CHARCOAL.

Cedar Run Furnace, Graham & Robinson, Graham's Forge, Wythe county. One stack, 32 x 9, built in 1832; cold blast; water-power; ore mined on the furnace property; specialty, car-wheel pig iron; daily capacity, 7 gross tons. D. P. Graham, part owner and General Manager. Selling agents, R. C. Hoffman & Co., Baltimore.—*Idle for several years.*

Liberty Furnace, Liberty Furnace P. O., Shenandoah county. Telegraph address, Edinburg. One stack, 55 x 11, built in 1890-1 on site of old stack built in 1821 and torn down in 1890; new stack blown in early in 1891; warm blast; Durham stove; ore, local limonite; product, car-wheel pig iron; annual capacity, 15,500 gross tons. Brand, "Liberty." A new railroad, 3-foot gauge, connects Liberty Furnace with Edinburg, 12 miles distant. (Columbia Furnace, built in 1809, torn down in 1890.) Owned by the Quaker City National Bank, Phila-

delphia. Address H. H. Yard, 415 Drexel Building, Philadelphia.—*Idle since 1893 and for sale or lease.*

Radford Furnace, Radford Iron Company, Radford Furnace P. O., Pulaski county. One stack, 35 x 10, built in 1868; warm blast; annual capacity, 2,500 gross tons. May be started up with coke as fuel when a projected branch of the Norfolk and Western Railway reaches the furnace. Richard Wood, President, 400 Chestnut st., Philadelphia.—*Idle since 1887 but in good condition.*

Reed Island Furnace, Reed Island Iron Company, Reed Island, Pulaski county. Furnace in Pulaski county, on Reed Island branch of the Norfolk and Western Railway. One stack, 33 x 9, put in blast April 28, 1881; cold blast; water-power; open top; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,250 gross tons. D. P. Graham, President; J. W. Robinson, Secretary and Treasurer; W. R. Tipton, Superintendent. Selling agents, R. C. Hoffman & Co., Baltimore.—*Active in 1897.*

Number of charcoal furnaces in Virginia: 4 stacks. Total number of furnaces in Virginia: 27 completed stacks, 1 stack partly erected, and 1 stack projected.

WEST VIRGINIA.

COKE.

Irondale Furnace, Independence, Preston county. Telegraph address, Newburg. One stack, 60 x 13½, built in 1861 and rebuilt in 1886; Gordon-Whitwell-Cowper stoves; fuel, coke, manufactured from coal mined on the furnace property; ores, a mixture of ⅔ limonite and ⅓ hematite, also obtained on the property; product, slightly cold-short pig iron; annual capacity, 16,000 gross tons. Brand, "F. N." C. R. Durbin, Receiver, Grafton, Taylor county, West Virginia.—*Idle for several years and for sale.*

Riverside Furnace, Riverside Iron Works, Wheeling, Ohio county. Furnace at Benwood, Marshall county. One stack, 75 x 17, built in 1871-2 and first blown in February 14, 1872; remodeled in 1876 and entirely rebuilt in 1889; four Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 80,000 gross tons. Brand, "Riverside."—*Active in 1898. See Steubenville Furnace in Ohio, Miscellaneous Bituminous list. See Rolling Mills and Steel Works in West Virginia.*

Wheeling Steel and Iron Company, Wheeling, Ohio county. Two stacks: Belmont Furnace, 70 x 16, blown in September 4, 1875; remodeled in 1893; three Gordon fire-brick stoves; brand, "Belmont;" N. Riester, Furnace Manager. Top Mill Furnace, 80 x 18, built in 1873-4 and blown in October 3, 1878; remodeled in 1888 and rebuilt in 1894; three Massicks & Crooke stoves; brand, "Top Mill;" James McCahan, Furnace Manager. Fuel, Connellsville coke; ore, Lake

Superior; product, Bessemer pig iron; total annual capacity, 140,000 gross tons.—*Active in 1898. See Martin's Ferry Furnace in Ohio, Miscellaneous Bituminous list. See Rolling Mills and Steel Works in West Virginia.*

Number of furnaces in West Virginia: 4 coke stacks. No charcoal stacks.

KENTUCKY.

BITUMINOUS COAL AND COKE.

Ashland Furnaces, Ashland Coal and Iron Railway Company, Ashland, Boyd county. Three stacks, all at Ashland: one, 62 x 16, first blown in August 31, 1869; one, 64 x 16, built in 1887; and one, 66 x 16, (leased from the Norton Iron Works,) built in 1873, blown in February 16, 1874, and remodeled in 1877. Eleven Whitwell stoves and one Massicks & Crooke stove; fuel, raw coal and coke; ores from Bath county; product, American-Scotch (high-silicon) pig iron; total annual capacity, 50,000 gross tons. Brand, "Ashland." Douglas Putnam, President and General Manager; John G. Peebles, Vice-President; Robert Peebles, Secretary and Treasurer; E. C. Means, Superintendent.—*Active in 1898.*

Paducah Furnace, Paducah, McCracken county. One stack, 70 x 14, built in 1889-90; not yet blown in; two Massicks & Crooke stoves; fuel, Connellsville coke; estimated annual capacity, 30,000 gross tons. Owned by R. J. Lackland, J. W. Harrison, and K. M. and C. R. Howard. Address E. C. Lackland, Trustee, Laclede Building, St. Louis, Mo.—*Never blown in; for sale.*

Watts (The) Steel and Iron Syndicate Limited, Middlesborough, Bell county. Two stacks, each 75 x 17, built in 1889-91; one stack blown in February 10 and the other March 10, 1893; seven Whitwell stoves; fuel, Middlesborough coke; ores, red fossiliferous and brown hematite from Claiborne county, and Ducktown ore from Polk county, Tenn.; product, pig iron suitable for conversion into basic open-hearth steel; total annual capacity, 130,000 gross tons. Brand, "Watts." Selling agents, C. L. Peirson & Co., Boston; Thomas W. Stiles, New York; J. W. Hoffman & Co., Philadelphia; Rogers, Brown & Co., Cincinnati and Chicago; The Domhoff and Joyce Company, Cincinnati; Rogers, Brown & Meacham, St. Louis.—*Active in 1898. See Rolling Mills and Steel Works in Kentucky.*

Number of bituminous coal and coke furnaces in Kentucky: 6 stacks.

CHARCOAL.

Bellefonte Furnace, Means and Russell Iron Company Incorporated, Ashland, Boyd county. Furnace in Greenup county. One stack, 33 x 10½, built in 1826 and rebuilt in 1854; open top; ore, limonite; product, "Bellefonte" warm-blast charcoal pig iron; annual capacity,

4,500 gross tons. W. B. Seaton, President and General Manager; C. W. Means, Secretary. Selling agents, F. A. Goodrich & Co., Detroit; W. J. Watkins & Co., Louisville.—*Idle since 1893.*

Grand Rivers Furnaces, The Columbian Land and Mining Company, Grand Rivers, Livingston county. Boston office, 53 State st. Two stacks: No. 1, or Blood Furnace, and No. 2, or Lawrence Furnace, each 60 x 13½, built in 1890-1; No. 1 blown in January 12 and No. 2 March 12, 1892; eight Durham pipe stoves; ore, local brown hematite; total annual capacity, 45,000 gross tons. Brand, "Grand Rivers." (Formerly operated by The Grand Rivers Company.) Henry L. Lawrence, Vice-President, Boston, Mass.; George Wallace, Treasurer, 53 State st., Boston, Mass.—*Idle since 1892 and for sale.*

Number of charcoal furnaces in Kentucky: 3 stacks. Total number of furnaces in Kentucky: 9 stacks.

TENNESSEE.

COKE.

Carnegie Furnace, Carnegie Furnace Company, Johnson City, Washington county. One stack, 75 x 16, nearly completed by the Carnegie Iron Company; work suspended in 1892; the present owners expect to complete the stack in 1898; three Whitwell stoves, each 65 x 18; will use Pocahontas or Stonega coke and Cranberry ore; product to be "special Bessemer" pig iron; annual capacity, 36,000 gross tons. H. Frederick Stone, President; George W. Dally, Secretary and Treasurer. For sale. Address Wilberforce Sully, 29 Broadway, New York City.—*Not completed; for sale.*

Chattanooga Furnace, The Chattanooga Iron Company, Atlanta, Ga. Furnace at Chattanooga, Hamilton county. One stack, 60 x 12, completed in 1874 and blown in in September, 1874; rebuilt in 1885; fuel, Dade county (Ga.) coke; ore, brown hematite; specialty, foundry pig iron; annual capacity, 24,000 gross tons. Brand, "Chattanooga." Julius L. Brown, President, and Elijah A. Brown, Secretary and Treasurer, Atlanta, Ga.—*Active in 1897.*

Citico Furnace, Citico Furnace Company, Chattanooga, Hamilton county. One stack, 69 x 17, built in 1883 and first put in blast in April, 1884; rebuilt in 1895; three Whitwell stoves; fuel, coke from New Soddy coal; ores, Tennessee and Georgia red and brown hematite; product, forge and foundry pig iron; annual capacity, 40,000 gross tons. Brand, "Citico." H. S. Chamberlain, President; F. Nieland, Secretary and Treasurer.—*Active in 1898.*

Dayton (The) Coal and Iron Company Limited, Dayton, Rhea county. Sales office, Johnston Building, Cincinnati, Ohio. Two stacks, one 75 x 20 and one 75 x 18, completed in 1885; seven Whitwell stoves; fuel, coke; ores, Tennessee fossil and Georgia hematite; product,

foundry pig iron; total annual capacity, 72,000 gross tons. Brand, "Dayton." W. J. Isaacson, Managing Director, Cincinnati; P. Johnson, Secretary, Dayton, Tenn.—*Active in 1898.*

Embreville Furnace, The Embreville Iron Company Limited, main office, 37 Lombard st., London, E. C., England. Cable address, "Nolachucky," London. Furnace at Embreville, Washington county. One stack, 80 x 17½, built in 1891 and blown in in 1892; three Cowper-Kennedy stoves, each 75 x 20; fuel, Pocahontas and Big Stone Gap coke; ore, local brown hematite; product, iron suitable for malleable castings and special pig iron; annual capacity, 45,000 gross tons. Brands, "Malleable" and "Special Machinery." All shipments made on analysis and iron of any analysis furnished. Guy R. Johnson, General Manager, Embreville. Sole sales agents, Matthew Addy & Co., Cincinnati.—*Active in 1898.*

Gracey-Woodward Iron Company, Clarksville, Montgomery county. One stack, 70 x 17, built in 1892 and first blown in December 8, 1895; three Whitwell stoves; fuel, coke; ore, local brown hematite; product, foundry pig iron; annual capacity, 36,000 gross tons. Julien F. Gracey, President; T. D. Luckett, Secretary and Treasurer.—*Active in 1896.*

Napier Iron Works, Nashville, Davidson county. Furnace at Napier, Lewis county. One stack, 60 x 12½, built in 1891 and blown in with charcoal as fuel in February, 1892; remodeled in 1897 and fuel changed from charcoal to coke; two fire-brick stoves; fuel, Virginia coke; ore, local brown hematite from furnace property; product, foundry pig iron; annual capacity, 30,000 gross tons. Brand, "Columbia." J. H. Fall, President; W. R. Cole, General Manager. Selling agents, Miller, Wagoner, Fieser & Co., Columbus, Chicago, and St. Louis.—*Active in 1898.*

Rockwood Furnace, Roane Iron Company, Rockwood, Roane county. Main office, Chattanooga. One stack, 70 x 16½, built in 1893 and blown in January 6, 1894; four Hugh Kennedy hot-blast stoves; fuel, coke; ore, red fossiliferous; product, foundry pig iron; annual capacity, 50,000 gross tons. Brand, "Rockwood." One stack, to be 70 x 16½, partly erected in 1893; work suspended. H. S. Chamberlain, President, C. M. McGhee, Vice-President, Orion L. Hurlbut, Secretary, and F. Nieland, Treasurer, Chattanooga; Willard Warner, Jr., Superintendent of Furnace, Rockwood. Selling agents for New England and Eastern New York, C. L. Peirson & Co., Boston, Massachusetts.—*Active in 1898.*

Tennessee Coal, Iron, and Railroad Company, Birmingham, Ala. Four stacks: Sewanee Furnace, at Cowan, Franklin county, 75 x 16; first blown in in June, 1880, and enlarged in 1891; three Whitwell stoves; fuel, coke, made in the ovens of the company at Tracy City; ores, soft red fossiliferous from the mines of the company and brown

hematite from the market; product, foundry and forge pig iron; annual capacity, 54,000 gross tons; brand, "Sewanee;" idle, and not likely to resume blast in the near future. South Pittsburg Furnaces, at South Pittsburg, Marion county, three stacks: No. 1, 70 x 18, first blown in in May, 1879; No. 2, 70 x 18, completed in 1881 and first blown in in March, 1882; No. 3, 75 x 17, built in 1887-8 and first blown in in March, 1888; ten Whitwell stoves; fuel, coke, made in the ovens of the company at Tracy City and Whitwell; ores, brown hematite from Georgia and hard red fossiliferous from the mines of the company; product, foundry and forge pig iron; annual capacity, 175,000 gross tons; brand, "South Pittsburg." A. P. Gaines, Superintendent South Pittsburg Furnaces. Total annual capacity of the four stacks, 229,000 gross tons. Officers of the company: N. Baxter, Jr., President, and James Bowron, 1st Vice-President and Treasurer, Birmingham, Ala.; A. M. Shook, 2d Vice-President, Nashville; G. B. McCormack, General Manager, Birmingham, Ala.; James L. Gaines, Assistant General Manager, Nashville, Tenn.; J. F. Fletcher, Jr., Secretary and Assistant Treasurer, H. D. Cooper, Auditor, and Erskine Ramsay, Chief Engineer, Birmingham, Ala. Selling agents, Rogers, Brown & Co., Boston, New York, Buffalo, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis; Matthew Addy & Co., Cincinnati and St. Louis.—*South Pittsburg Furnaces active in 1898 and Sewanee idle since 1895. See Coke Furnaces in Alabama.*

Number of coke furnaces in Tennessee: 12 completed stacks, 1 stack nearly completed, and 1 stack partly erected.

CHARCOAL.

Bear Spring Furnace, White, Dixon & Co., lessees, Bear Spring, Stewart county. Telegraph address, Clarksville. One stack, 47 x 9½, built in 1832, abandoned in 1854, rebuilt in 1873, and again abandoned; repaired in 1893-4 and blown in in February, 1894; cold blast; ore, local brown hematite; specialty, pig iron for chilled rolls; annual capacity, 5,000 gross tons. Brand, "Dover." George W. Dixon, Superintendent. Selling agents, J. H. Hillman & Co., Pittsburgh. Owned by the Cumberland River Estates.—*Active in 1897.*

Buffalo Iron Company, Nashville, Davidson county. Main office, Manie, Wayne county, but business transacted from Nashville. Six stacks: Aetna Furnace, at Aetna, Hickman county, 55 x 11, built in 1886 and first put in blast November 13, 1886; hot or cold blast; two Whitwell stoves; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 18,000 gross tons; brand, "Aetna." Cumberland Furnace, at Cumberland Furnace P. O., Dickson county, 60 x 11, built on site of old furnace in 1892-3 and blown in March 25, 1893; two Gordon improved stoves; ore, local brown hematite;

specialties, foundry and car-wheel pig iron; annual capacity, 15,000 gross tons; brand, "Warner." Warner Furnaces, in Hickman county: No. 1, at Warner, 55 x 11, first put in blast November 12, 1881; No. 2, (formerly called Standard Furnace,) at Goodrich, 45 x 9, first blown in December 23, 1885; hot or cold blast; ore, local brown hematite; product, car-wheel pig iron; total annual capacity, 36,000 gross tons; brand, "Warner." Allen's Creek Furnaces, (formerly called Mannie Furnaces,) at Mannie, Wayne county: two stacks, 60 x 12, built in 1892-3, using machinery, etc., from the two abandoned coke furnaces at West Nashville; one stack blown in April 22, 1893, and the other not yet blown in; two Gordon improved stoves; ore, local brown hematite; specialty, basic pig iron; total annual capacity, 36,000 gross tons; brand, "Mannie." Total annual capacity of the six stacks, 105,000 gross tons. (Formerly operated by The Central Iron Company.) Robert Ewing, President; J. A. Cooper, Secretary and Treasurer. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis.—*Allen's Creek Furnaces active in 1898; Aetna, Warner, and Cumberland idle since 1893. See Attalla (charcoal) Furnace in Alabama.*

Number of charcoal furnaces in Tennessee: 7 stacks. Total number of furnaces in Tennessee: 19 completed stacks, 1 stack nearly completed, and 1 stack partly erected.

NORTH CAROLINA.

COKE.

Carolina Furnace, The Greensboro Furnace Company, Greensboro, Guilford county. One stack, 70 x 16 $\frac{3}{4}$, built in 1892; iron shell on cast iron columns; not yet blown in; two Ford & Moncur stoves; fuel, Pocahontas coke; ores, local magnetite and limonite from the company's mines; product, to be neutral foundry pig iron; annual capacity, 35,000 gross tons. James D. Kase, General Manager.—*Never blown in.*

Cranberry Furnace, Cranberry Iron and Coal Company, Cranberry, Mitchell county. Philadelphia office, 240 South Third st. One stack, 50 x 11 $\frac{1}{2}$, built in 1883-4 and blown in April 16, 1884; hot and cold blast; fuel, coke, but formerly used charcoal; ore, magnetic mined on the company's property; product, pig iron of Bessemer quality; annual capacity, 5,200 gross tons. Brand, "Cranberry." R. F. Hoke, President; J. S. Wise, Secretary and Treasurer; C. H. Nimson, General Manager. Selling agents, Matthew Addy & Co., Cincinnati.—*Active in 1896.*

Number of furnaces in North Carolina: 2 coke stacks. No charcoal stacks.

GEORGIA.

COKE.

Cherokee Iron Works, Cherokee Iron Company, Cedartown, Polk county. One stack, 60 x 14, built in 1874-5 and first blown in on charcoal March 22, 1877; rebuilt and changed to coke in 1885; cast-iron stoves; fuel, Glen Mary and Flat Top (Virginia) coke; ore, brown hematite mined near the works; product, high grades of foundry and mill pig iron; daily capacity, 75 gross tons. Brand, "Cherokee." William C. Browning, President, and J. Hull Browning, Vice-President and Treasurer, 408 Broome st., New York; J. R. Barber, Secretary and General Manager, Cedartown. Selling agents, Hall Brothers & Co., Louisville.—*Idle for several years.*

Rising Fawn Furnace, Southern Mining Company, Atlanta. Furnace at Rising Fawn, Dade county. One stack, 75 x 17, built in 1873-5 and put in blast June 18, 1875; four Whitwell stoves, each 60 x 16; fuel, coke; ore, brown hematite; product, foundry pig iron; annual capacity, 36,000 gross tons. Brand, "Rising Fawn." (Formerly operated by the Georgia Mining, Manufacturing, and Investment Company.) T. D. Meador, President, Clifford L. Anderson, Vice-President, St. Julien Ravenel, Secretary, and C. T. Watson, Treasurer, Atlanta; F. H. Connor, General Manager, Cole City.—*Active in 1896.*

Number of coke furnaces in Georgia: 2 stacks.

CHARCOAL.

Etna Furnace, Etna Manufacturing Company, lessee, Etna P. O., Polk county. One stack, 43 x 9½, built in 1870; rebuilt in 1889; hot blast; ore, brown hematite mined on the furnace property; product, strictly first-class car-wheel pig iron; annual capacity, 9,000 gross tons. Brand, "Etna." D. B. Hamilton, Jr., President, Rome; A. S. Hamilton, Vice-President, Trion Factory; Harper Hamilton, Secretary and Treasurer, Etna. Owned by the Etna Furnace Company.—*Idle for several years.*

Rome Furnace, The Rome Iron Company, Rome, Floyd county. General office, Chattanooga, Tenn. One stack, 65 x 12, built in 1890-1 and blown in in May, 1891; three Whitwell stoves; ore, brown hematite from Floyd, Polk, and Chattooga counties; product, car-wheel pig iron; annual capacity, 15,500 gross tons. Brands, "Rome" and "Colyar." L. S. Colyar, President and Treasurer; Charles A. Lyerly, Vice-President; E. Shackleford, Secretary. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis.—*Active in 1898.*

Number of charcoal furnaces in Georgia: 2 stacks. Total number of furnaces in Georgia: 4 stacks.

ALABAMA.

COKE.

Clifton Furnace, Clifton Iron Company, Ironaton, Talladega county.

One stack, No. 1, 70 x 16, built to use charcoal in 1884 and blown in on that fuel on April 16, 1885; changed to coke in 1895; rebuilt in 1896-7; three Whitwell stoves; fuel, Alabama coke; ore, local brown hematite; product, foundry pig iron; annual capacity, 64,000 gross tons. Brand, "Clifton." T. G. Bush, President, Anniston; Augustus Lowell, Vice-President, and C. L. Peirson, Treasurer, Boston, Mass.; Paul Roberts, Secretary and Assistant Treasurer, Ironaton. Selling agents, Matthew Addy & Co., Cincinnati and St. Louis; C. L. Peirson & Co., Boston and New York.—*Active in 1896. See Charcoal Furnaces in Alabama.*

Fort Payne Furnace, DeKalb Furnace Company, Fort Payne, DeKalb county. One stack, 65 x 14, built in 1889-90 and blown in September 3, 1890; three Siemens-Cowper-Cochrane stoves; fuel, coke; ores, red and brown hematite; product, forge and foundry pig iron; annual capacity, 27,000 gross tons. (Formerly operated by the Fort Payne Furnace Company.) A. L. Sayles, President; E. Dudley Freeman, Treasurer.—*Idle for several years and for sale or lease.*

Gadsden-Alabama Furnace, Gadsden, Etowah county. One stack, 75 x 16, built in 1887-8 and first blown in October 14, 1888; three Whitwell stoves; fuel, coke; ores, local red and brown hematite; product, foundry and basic pig iron; annual capacity, 35,000 gross tons. Brand, "Etowah." Owned by Thomas T. Hillman, George L. Morris, and Mrs. Aileen Ligon, of Birmingham.—*Idle since 1893 and for sale or lease.*

Hattie Ensley Furnace, Colbert Furnace Company, lessee, Sheffield, Colbert county. One stack, 75 x 17, built in 1887 and blown in December 31, 1887; three Whitwell stoves; fuel, coke; ore, local brown hematite; product, foundry pig iron; annual capacity, 48,000 gross tons. Brand, "Lady Ensley." A. A. Berger, President; Wade Allen, Vice-President; J. V. Allen, Secretary and Treasurer; A. J. McGarry, Manager. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis. Owned by the James P. Witherow Company, Pittsburgh.—*Active in 1898.*

Mary Pratt Furnace, W. T. Underwood, Birmingham, Jefferson county. One stack, 65 x 14, built in 1882 and first put in blast in April, 1883; rebuilt in 1889; three Whitwell stoves; fuel, coke; ores, local brown and red fossiliferous; annual capacity, 30,000 gross tons. Brand, "Mary Pratt."—*Idle for several years.*

Philadelphia Furnace, Florence, Lauderdale county. One stack, 75 x

17, commenced by the W. B. Wood Furnace Company in 1887 and completed by the Florence Cotton and Iron Company in 1890-1; three Whitwell stoves, each 70 x 20; fuel, coke; ore, brown hematite from Lawrence county, Tenn.; product, foundry pig iron; annual capacity, 45,000 gross tons. Brand, "Philadelphia." (Formerly operated by the Florence Cotton and Iron Company.) In hands of bondholders; Robert Dornan, William H. Arrott, and James Pollock, committee for owners; E. Cooper Shapley, attorney, Stephen Girard Building, Philadelphia.—*Idle since 1893 and for sale.*

Pioneer Furnaces, Pioneer Mining and Manufacturing Company, Thomas, Jefferson county. Two stacks, each 75 x 16½: No. 1 built in 1886-8 and blown in May 15, 1888; No. 2 built in 1889-90 and blown in February 22, 1890; eight Siemens-Cowper-Cochrane stoves; fuel, Alabama coke; ores, red and brown hematite from company's mines near the furnaces; product, foundry pig iron; total annual capacity, 95,000 gross tons. Brand, "Pioneer." Edwin Thomas, President, and Samuel Thomas, Vice-President, Catasauqua, Pennsylvania; George H. Myers, Secretary and Treasurer, Bethlehem, Pennsylvania. Selling agents, Matthew Addy & Co., Cincinnati; W. R. Thomas, 50 Wall st., New York; Dallett & Co., 201 Walnut Place, Philadelphia.—*Active in 1898.*

Sheffield Furnaces, Sheffield Coal, Iron, and Steel Company, Sheffield, Colbert county. Three stacks, each 75 x 18, built in 1887-8; No. 1 blown in in September, 1888; No. 2 blown in in October, 1889; No. 3 blown in in April, 1896; Nos. 1 and 2 rebuilt in 1891 and Nos. 2 and 3 remodeled in 1897; nine Whitwell-Cowper stoves; fuel, Alabama and Virginia coke; ores, Alabama and Tennessee brown hematite; product, foundry pig iron; total annual capacity, 255,000 gross tons. Brand, "Sheffield." A. W. Wills, President; E. W. Cole, Vice-President; T. D. Radcliffe, Secretary; S. B. McTyer, Treasurer; J. J. Gray, Jr., Superintendent. Selling agents: east of the Allegheny mountains and in foreign countries, Rogers, Brown & Co., New York; west of the Allegheny mountains, except in Louisville, Ky., and Jeffersonville, Indiana, Miller, Wagoner, Fieser & Co., Columbus, Ohio; for Louisville and Jeffersonville only, Hickman, Williams & Co., Louisville.—*Active in 1898.*

Sloss Furnaces, Sloss Iron and Steel Company, Birmingham, Jefferson county. Four stacks: No. 1, 82½ x 18, built in 1881-2, put in blast April 12, 1882, and rebuilt in 1895; No. 2, 73 x 18, built in 1882; No. 3, 73 x 17, built in 1887-8 and blown in in October, 1888; No. 4, 73 x 17, built in 1887-9 and blown in in February, 1889; five Whitwell, eight Gordon-Whitwell-Cowper, and three two-pass 18 x 70 and two new four-pass stoves; fuel, coke; ores, red fossiliferous, hard and soft, and brown hematite; ores and coal mined on the company's property within 10 to 15 miles of furnaces; product, foundry and mill

pig iron; total annual capacity, 225,000 gross tons. Brand, "Sloss." Sol. Haas, President; E. W. Rucker, Vice-President; J. W. McQueen, Secretary; A. H. McCormick, Treasurer. Selling agents, D. L. Cobb, Louisville, Chicago, and St. Louis; C. R. Baird & Co., Philadelphia, for Eastern half of Pennsylvania and Western New York; Thomas A. Mack, Cincinnati, for Western half of Pennsylvania and the State of Ohio; Hugh W. Adams & Co., 15 Beekman st., New York, and 85 Water st., Boston; J. R. Lehmer, Omaha, Neb.; H. W. Jacques, Kansas City, Mo.; C. L. Baum, Salt Lake City, Utah; John M. Martin, San Francisco, Cal.—*Active in 1898.*

Spathite Furnace No. 1, Spathite Iron Company, Nashville, Tennessee. Furnace at Birmingham, Jefferson county. One stack, 65 x 15½; commenced building February 9, 1890; blown in August 23, 1890; remodeled in 1897; three Massicks & Crooke stoves; fuel, Alabama coke; ores, spathite and brown; product, spathite pig iron; annual capacity, 40,000 gross tons. Brand, "Spathite." (Formerly called Clara Furnace.) Thomas Sharp, President; William M. Duncan, Vice-President; John P. Helms, Secretary and Treasurer.—*Idle since 1892 but getting ready to blow in.*

Spathite Furnace, Florence, Lauderdale county. One stack, 75 x 14, completed in December, 1888, and blown in in October, 1889; rebuilt in 1893; three improved Pollock stoves; fuel, coke; ores, spathite and brown hematite from Iron City, Tenn.; product, spathite pig iron; annual capacity, 30,000 gross tons. Brand, "Spathite." (Formerly called North Alabama Furnace.) Owned by the Columbia Finance and Trust Company, of Louisville, Kentucky, assignee of the Kentucky Trust Company of Louisville.—*Idle since 1895 and for sale.*

Talladega Furnace, Alabama Iron and Railroad Company, 46 Wall st., New York City. Furnace at Talladega, Talladega county. One stack, 72 x 18, built in 1889 and blown in October 5, 1889; three Ford & Moncur stoves, each 62 x 26; fuel, Alabama and West Virginia coke; ore, local brown hematite; product, Bessemer, foundry, and forge pig iron; annual capacity, 40,000 gross tons. Brand, "Talladega." Rudolph Gutmann, President; William P. Parrish, Secretary.—*Idle for several years.*

Tennessee Coal, Iron, and Railroad Company, Birmingham, Alabama. Thirteen stacks in Jefferson county, Alabama. Five stacks at Bessemer: Nos. 1 and 2, each 75 x 17, built in 1886-7; No. 1 put in blast in 1888 and No. 2 in 1889; seven Whitwell stoves; Nos. 3 and 4, each 75 x 17, built in 1889-90; eight Whitwell stoves; No. 5, or Little Belle, 60 x 12, built in 1889-90; three Whitwell stoves; fuel, Pratt and Blue Creek coke made in the company's ovens; ores, red and brown from the company's mines; product, foundry, forge, and basic pig iron; annual capacity, 292,000 gross tons; brand, "DeBardeleben." Oxmoor Furnaces, at Oxmoor, (for-

merly called Eureka Furnaces,) two stacks: No. 1, 75 x 17, completed in July, 1877, and rebuilt and blown in in December, 1885; No. 2, 75 x 17, first blown in in March, 1876, and rebuilt and blown in in August, 1886; seven Whitwell stoves; fuel, Pratt and Blue Creek coke made in the company's ovens; ores, red and brown from the company's mines; product, foundry and forge pig iron; annual capacity, 126,000 gross tons; brand, "Eureka." John Dowling, Superintendent of Bessemer and Oxmoor furnaces. Alice Furnaces, at Birmingham, two stacks: No. 1, 75 x 15, built in 1879-80 and put in blast November 23, 1880; raised to present height in 1890; three Gordon-Whitwell-Cowper stoves; No. 2, 75 x 18, built in 1883 and put in blast July 24, 1883; three Whitwell stoves; fuel, Pratt coke made in the company's ovens; ores, red and brown from the company's mines; product, basic and foundry pig iron; annual capacity, 113,000 gross tons; brand, "Alice." Ensley Furnaces, at Ensley: four stacks, each 80 x 20, built in 1887, 1888, and 1889; No. 1 blown in March 19, 1889, No. 2, December 1, 1888, No. 3, June 5, 1888, and No. 4, April 9, 1888; four Gordon-Whitwell-Cowper stoves to each furnace; fuel, Pratt coke from the company's ovens; ores, red and brown from the company's mines; product, foundry and forge pig iron; annual capacity, 292,000 gross tons; brand, "Ensley." A. E. Barton, Superintendent Alice and Ensley Furnaces. Total annual capacity of the thirteen stacks, 823,000 tons.—*Active in 1898. See Coke Furnaces in Tennessee for a full list of the officers of the company and its selling agents.*

Trussville Furnace, Trussville, Jefferson county. One stack, 65 x 17, built in 1887-9 and blown in in April, 1889; three Whitwell stoves; fuel, Alabama coke; ore, local red hematite; product, foundry pig iron; annual capacity, 30,000 gross tons. Brand, "Trussville." Owned by Messrs. Hogsett, Ewing & Thompson, Uniontown, Pennsylvania.—*Idle since 1893.*

Williamson Furnace, Williamson Iron Company, Birmingham, Jefferson county. One stack, 65 x 13 $\frac{3}{4}$, built in 1886 and first blown in in October, 1886; three Massicks & Croke stoves; fuel, coke, made at Coalburg; ores, red fossil and brown hematite; product, foundry and mill pig iron; annual capacity, 18,000 gross tons. Brand, "Williamson." C. P. Williamson, President and Manager; J. B. Simpson, Secretary; H. D. Williamson, Superintendent.—*Idle since 1892.*

Woodstock Furnaces, The Woodstock Iron Works, Anniston, Calhoun county. Two stacks: No. 3, 75 x 16, built in 1887-9, blown in October 10, 1889, and blown out June 4, 1892; No. 4, 75 x 17, built in 1887-9, blown in June 12, 1892, and rebuilt in 1896; seven Whitwell stoves; fuel, Alabama coke; ore, local brown hematite; product, foundry pig iron; annual capacity of No. 4, 60,000 gross tons. Brand, "Woodstock, (W. I. W.)" (Stacks Nos. 1 and 2, charcoal,

have been abandoned.) John D. Probst, President, and George Glover, Secretary, New York; Hoffman Atkinson, Vice-President and Treasurer, and A. H. Quinn, Assistant Treasurer, Anniston. Selling agents, J. E. Pope, Jr., New York; J. W. Hoffman & Co., Philadelphia; Rogers, Brown & Co., Cincinnati and Chicago, north of the Ohio river and west of the Allegheny mountains; Stevenson, Field & Co., Columbus, for the Southwest; R. H. Screven, Columbus, Georgia.—*Active in 1898.*

Woodward Iron Company, Woodward, Jefferson county. Two stacks, each 75 x 17, one built in 1882-3 and put in blast in August, 1883, and the other built in 1886; eight Whitwell stoves; fuel, coke, made from the company's coal; ore, red fossiliferous mined within 3 miles of the furnace; specialty, foundry pig iron; total annual capacity, 100,000 gross tons. Brand, "Woodward." J. H. Woodward, President; Frank M. Eaton, Secretary; Silas Hine, Treasurer; J. H. McCune, General Superintendent.—*Active in 1898.*

PARTLY ERECTED.

Bay State Furnace, Bessemer Land and Improvement Company, Bessemer, Jefferson county. One stack, to be 65 x 14, partly erected at Fort Payne, DeKalb county, in 1890-1 by the Bay State Furnace Company; work suspended in 1891; three fire-brick stoves.—*Not completed and for sale.*

Number of coke furnaces in Alabama: 37 completed stacks and 1 stack partly erected upon which work has been suspended.

CHARCOAL.

Attalla Furnace, Buffalo Iron Company, Nashville, Tenn. Furnace at Attalla, Etowah county. One stack, 55 x 11, built in 1888-9 and blown in June 15, 1889; iron stoves; ores, red and brown hematite from Etowah and Cherokee counties; product, car-wheel pig iron; annual capacity, 18,000 gross tons. Brand, "Attalla."—*Idle since 1892. See Charcoal Furnaces in Tennessee.*

Bibb Furnace, Alabama Iron and Steel Company, Brierfield, Bibb county. One stack, 55 x 12, built in 1864 to use charcoal; rebuilt in 1881 and remodeled in 1886 to use coke; returned to the use of charcoal in 1890; rebuilt in 1892; warm blast; ore, brown hematite mined in the vicinity; product, car-wheel pig iron; annual capacity, 14,500 gross tons. Brand, "Bibb." Selling agents, C. R. Baird & Co., Philadelphia; DeCamp Brothers & Yule, St. Louis; Forster, Waterbury & Co., Chicago.—*Idle since 1894. See Rolling Mills in Alabama.*

Clifton Furnace, Clifton Iron Company, Ironaton, Talladega county. One stack, No. 2, 60 x 14, built in 1889-90 and blown in in 1891; hot blast; ore, local brown hematite; product, car-wheel and malleable pig iron; annual capacity, 22,000 gross tons. Brand, "Clifton."

Selling agents, Matthew Addy & Co., Cincinnati and St. Louis; C. L. Peirson & Co., Boston and New York.—*Idle since 1895. See Coke Furnaces in Alabama.*

Jenifer Furnace, Jenifer Furnace Company, Jenifer, Talladega county. Central office, Anniston. One stack, 56 x 11, built in 1892 and blown in December 5, 1892, taking the place of the old stone stack built in 1863; two Hugh Kennedy stoves, each 45 x 16; warm and cold blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 12,000 gross tons. Brand, "Jenifer." May change from a charcoal to a coke stack after the next blast. John H. Noble, President, and John E. Ware, Secretary and Treasurer, Anniston. Selling agents, Rogers, Brown & Co., Cincinnati, and Rogers, Brown & Meacham, St. Louis; C. R. Baird & Co., Philadelphia.—*Idle since 1895.*

Rock Run Furnace, Rock Run Iron and Mining Company, Rock Run, Cherokee county. One stack, 54½ x 11, built in 1873-4, enlarged in 1881 and in 1892, and rebuilt in 1894; warm blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 15,000 gross tons. Brand, "Rock Run." J. H. Bass, President, J. I. White, Secretary, and F. S. Lightfoot, Treasurer, Fort Wayne, Indiana; J. M. Garvin, Superintendent, Rock Run.—*Active in 1898.*

Round Mountain Furnace, The Round Mountain Furnace Company, lessee, Chattanooga, Tenn. Furnace at Round Mountain, Cherokee county. One stack, 45 x 9½, built in 1853, rebuilt in 1874, and remodeled in 1888; cold blast; ore, red fossiliferous; specialty, cold-blast pig iron for chilled rolls and car-wheels; annual capacity, 6,500 gross tons. Brand, "Round Mountain." (Formerly called Round Mountain Iron Works.) L. S. Colyar, President; Jo. C. Guild, Vice-President; E. Shackelford, Secretary; E. B. Pennington, Superintendent. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis. Owned by the Round Mountain Coal and Iron Company, Round Mountain.—*Active in 1896.*

Shelby Furnaces, Shelby Iron Company, Shelby, Shelby county. Two stacks: Nos. 1 and 2, each 60 x 14, built in 1863 and 1873; No. 1 rebuilt in 1889; warm blast; ore, brown hematite obtained on the furnace property; product, car-wheel pig iron; total annual capacity, 40,000 gross tons. Brand, "Shelby." T. G. Bush, President, Anniston; B. Y. Frost, Secretary, and W. S. Gurnee, Treasurer, 80 Broadway, New York; E. T. Witherby, Assistant Treasurer, Shelby. Selling agents, Matthew Addy & Co., Cincinnati; C. L. Peirson & Co., Boston and New York.—*Active in 1898.*

Number of charcoal furnaces in Alabama: 8 stacks. Total number of furnaces in Alabama: 45 completed stacks and 1 stack partly erected upon which work has been suspended.

TEXAS.

CHARCOAL.

Jefferson Furnace, Jefferson Iron Company, Jefferson, Marion county. One stack, 60 x 12, built in 1889-91 and blown in March 15, 1891; two Durham iron stoves; hot blast; ores, local brown hematite, fossiliferous, bog, and carbonate; product, car-wheel pig iron; annual capacity, 13,500 gross tons. Brand, "Lone Star." W. T. Atkins, President; A. H. Schluter, Secretary.—*Idle since 1893 and for sale. See partly completed Rolling Mills in Texas, (Jefferson Iron Company.)*

Old Alcalde Furnace, State of Texas, owner; J. S. Rice, Financial Agent, Huntsville. Furnace at Rusk, Cherokee county. One stack, 55 x 10½, built in 1883 and put in blast February 27, 1884; rebuilt in 1896; hot blast; ore, brown hematite mined near the furnace; product, car-wheel and foundry pig iron; annual capacity, 10,000 gross tons. Brand, "Old Alcalde." A pipe foundry is connected with the works. J. F. Cochran, Superintendent of Furnace. Selling agents, J. S. Rice, Huntsville, and N. M. Harrison, Rusk.—*Active in 1898.*

Star and Crescent Furnace, Frank A. Daniels, New Orleans, La. Furnace near Rusk, in Cherokee county. One stack, 65 x 11, built in 1890-1 and blown in November 26, 1891; iron stoves; hot blast; ores, brown hematite and black laminated; product, car-wheel and foundry pig iron; annual capacity, 18,000 gross tons. Brand, "Star and Crescent."—*Idle since 1892 and for sale.*

Tassie Belle Furnace, New Birmingham, Cherokee county. One stack, 60 x 11, built in 1889-90 and blown in in November, 1890; two Weimer pipe stoves; warm blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 13,500 gross tons. Brand, "Tassie Belle." Richard L. Coleman, General Agent.—*Idle for several years.*

Number of furnaces in Texas: 4 charcoal stacks. No coke stacks.

OHIO.

MAHONING VALLEY—COKE.

Anna Furnace, The Struthers Furnace Company, Perry-Payne Building, Cleveland. Furnace at Struthers, Mahoning county. One stack, 75 x 16, built and blown in in 1869; rebuilt in 1881 and in 1895; three Julian Kennedy stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 90,000 gross tons. (Formerly owned and operated by The Brown Bonnell Iron Company.) W. C. Runyon, President; J. B. Stubbs, Vice-President and Treasurer; A. Grossman, Secretary; S. A. Richards, Manager.—*Active in 1898.*

Cherry Valley Furnace, Cherry Valley Iron Works, Leetonia, Colum-

biana county. One stack, 75 x 16, built in 1868 and rebuilt in 1883; four iron stoves; fuel, coke; ores, Lake Superior and native mixed; specialty, "American-Scotch" foundry pig iron; annual capacity, 60,000 gross tons. Brand, "Cherry Valley."—*Active in 1898. See Rolling Mills in Ohio, (Mahoning Valley District.)*

Grace Furnace No. 2, The Brier Hill Iron and Coal Company, Youngstown, Mahoning county. One stack, 77 x 19, built in 1890; four Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, basic open-hearth, and low-phosphorus pig iron; annual capacity, 100,000 gross tons. Brand, "Brier Hill." (Grace Furnace No. 1, 80 x 18, built in 1861, torn down in 1873, and rebuilt in 1882, abandoned in 1897.) George Tod, President; Henry Tod, Vice-President; J. G. Butler, Jr., General Manager; H. H. Stambaugh, Secretary and Treasurer.—*Active in 1898.*

Hannah Furnace, The Mahoning Valley Iron Company, Youngstown, Mahoning county. One stack, 75 x 16, first put in blast June 14, 1880; rebuilt in 1888; three Cowper-Kennedy stoves and one Massicks & Crooke stove; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer and mill pig iron; annual capacity, 65,000 gross tons. W. A. Barrows, Superintendent.—*Active in 1898. See Rolling Mills in Ohio, (Mahoning Valley District.)*

Haselton Iron Works, The Andrews Brothers Company, Youngstown, Mahoning county. Works at Haselton, now a part of Youngstown. One stack, 76 x 18, built in 1867 and rebuilt in 1880, 1892, and 1896; four Cowper-Kennedy stoves; fuel, coke; product, Bessemer, foundry, and mill pig iron from Lake Superior ores, and "American-Scotch" pig iron from a blackband ore obtained at Mineral Ridge, 12 miles from the furnace; annual capacity, 120,000 gross tons. Brand, "Haselton." Western office, New York Life Building, Chicago, John McLauchlan, Manager; eastern office, 488 Ellicott Square, Buffalo, New York, W. S. Johnston, Manager.—*Active in 1898. See Rolling Mills in Ohio, (Mahoning Valley District.)*

Hubbard Furnaces, The Andrews and Hitchcock Iron Company, Youngstown, Mahoning county. Works at Hubbard, Trumbull county. Two stacks: No. 1, 77 x 17, built in 1867, and No. 2, 76 x 17, built in 1872; No. 1 rebuilt in 1886 and No. 2 rebuilt in 1883 and 1894; No. 1 stack has four Cowper-Kennedy stoves and No. 2 has iron stoves; fuel, Connellsville coke; product, Bessemer and foundry pig iron. "Hubbard strong foundry" is made from a mixture of Lake Superior specular and magnetic ores; "Hubbard Scotch" is from $\frac{3}{4}$ Trumbull county blackband and $\frac{1}{4}$ Lake Superior ore, and sells in place of Scotch pig iron. Total annual capacity, 130,000 gross tons. William J. Hitchcock, President; Mrs. C. H. Andrews, Vice-President; Frank Hitchcock, Secretary and Treasurer. Selling agents, C. L. Peirson & Co., 44 Kilby st., Boston, for New

England, Eastern New York, New Jersey, and Eastern Pennsylvania.—*Active in 1898.*

Mary Furnace, The Ohio Iron and Steel Company, Lowellville, Mahoning county. One stack, 75 x 16½, built in 1845, rebuilt in 1872, and remodeled in 1883 and 1894; three Cowper-Kennedy hot-blast stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, basic open-hearth, and strong neutral foundry pig iron; specialties, "Ohio Scotch" and Bessemer iron of special analysis cast in chills; annual capacity, 100,000 gross tons. Brands, "The Mary" for lake ore iron and "Ohio Scotch" for blackband mix. (Will probably add another stove, put in new boilers, etc., in 1898.) Thomas H. Wells, President; John C. Wick, Vice-President; F. H. Wick, Treasurer; Robert Bentley, Secretary and General Manager. Selling agents, Pickands, Brown & Co., Chicago; Pickands, Mather & Co., Cleveland; Arthur W. Howe, Drexel Building, Philadelphia; N. S. Bartlett & Co., New York and Boston.—*Active in 1898.*

Mattie Furnace, Girard Iron Company, Girard, Trumbull county. One stack, 80 x 19, built in 1866, remodeled in 1879, stack raised in 1884, and rebuilt in 1892 and 1896; three Foote stoves, 70 x 20; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, foundry, and forge pig iron; annual capacity, 100,000 gross tons. Brand, "Girard." (Formerly called Girard Furnace.) A. M. Byers, sole owner, Pittsburgh; Henry B. Shields, Manager, Girard. Sales made by the company.—*Active in 1898.*

Phoenix Furnace, The Brown Bonnell Iron Company, Youngstown, Mahoning county. One stack, 60 x 15, built in 1854; three iron stoves; fuel, Connellsville coke; ore, Lake Superior; product, gray forge pig iron; annual capacity, 40,000 gross tons. Brand, "Phoenix." (Falcon Furnace, 55 x 12½, abandoned in 1893; Anna Furnace, at Struthers, sold to The Struthers Furnace Company.)—*Active in 1896. See Rolling-Mills in Ohio, (Mahoning Valley District.)*

Seneca Furnace, The Salem Iron Company, Pittsburgh, Pa. Furnace at Leetonia, Columbiana county. One stack, 76 x 17, built in 1866 and rebuilt in 1894; three Cowper-Kennedy stoves, 75 x 20; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, foundry, and forge pig iron; annual capacity, 90,000 gross tons. Brands, "Seneca" and "Grafton." (One stack, 54 x 15, built in 1872, abandoned in 1894.) L. C. Hanna, Chairman of Board of Directors; John McKeefrey, President; D. Z. Norton, Vice-President; George J. Gorman, Treasurer; W. D. McKeefrey, General Manager. Selling agents, McKeefrey & Co., Leetonia and Pittsburgh.—*Active in 1898.*

Thomas Furnace, The Thomas Furnace Company, Niles, Trumbull county. One stack, 76 x 17; original stack built in 1870, enlarged in 1883, and torn down and rebuilt in 1890; entirely new equipment; four Massicks & Croke stoves; fuel, Connellsville coke; ore, Lake

Superior; product, Bessemer and foundry pig iron; annual capacity, 100,000 gross tons. Brand, "Thomas." J. M. Thomas, Secretary and Treasurer; W. Aubrey Thomas, Superintendent.—*Active in 1898.*

Tod Furnace, The Youngstown Steel Company, Youngstown, Mahoning county. One stack, 79 x 16½, built in 1889 and rebuilt in 1896; four Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, basic, and foundry pig iron; annual capacity, 80,000 gross tons. (Formerly known as Tod Furnace No. 2 of The Brier Hill Iron and Coal Company.) Edward L. Ford, General Superintendent. Selling agents, H. G. Dravo, Pittsburgh; John L. Hogan & Co., Philadelphia; Tod, Stambaugh & Co., Cleveland.—*Active in 1898. See Rolling Mills and Steel Works in Ohio, (Mahoning Valley District.)*

PROJECTED.

Ohio (The) Steel Company, Youngstown, Mahoning county. Contemplates erecting in 1898 two modern blast furnaces at Youngstown, Mahoning county. *See Rolling Mills and Steel Works in Ohio, (Mahoning Valley District.)*

Number of coke furnaces in the Mahoning Valley, including furnaces in Columbiana county: 13 completed stacks and 2 stacks projected.

HOCKING VALLEY—BITUMINOUS COAL OR COKE.

Columbus and Hocking Coal and Iron Company, Columbus. New York office, 80 Broadway. Four stacks: Akron Furnace, at Buchtel, Athens county, one stack, 60 x 16, built at Akron in 1872, removed to Buchtel in 1877, and blown in in 1877; four Thomas stoves. Bessie Furnace, at New Straitsville, Perry county, one stack, 60 x 14, built in 1877-8 and blown in in 1878; four Whitwell stoves. Winona Furnace, at Winona Furnace P. O., Hocking county, one stack, 50 x 12½, completed in 1878 and blown in February 20, 1878; three Whitwell stoves. Greendale Furnace, at Greendale, Hocking county, one stack, 58 x 15, first put in blast November 8, 1879; the machinery was formerly used at Kenton Furnace, at Newport, Ky.; three Player stoves; (also called Craft's Furnace.) Fuel, raw bituminous coal obtained from the company's mines near the furnaces; ores, native and Lake Superior; product, foundry, silvery, and high-silicon pig iron, the latter containing from 8 to 12 per cent. of silicon; total annual capacity, 85,500 gross tons. Brands, "Bessie" and "Winona" for silvery and "Pencost" for high silicon. Jay O. Moss, President; R. H. Johnson, Vice-President and General Manager; S. A. McManigal, Secretary; E. M. Mancourt, Treasurer.—*Idle since 1895.*

New York Furnaces, The Ohio Mining and Manufacturing Company, 44 Pine st., New York. Furnaces at Shawnee, Perry county. Two stacks: one, 50 x 14½, built in 1877 and blown in November 10,

1877; one cast-iron stove; the other, 65 x 16, built in 1887 and blown in December 15, 1887; two Gordon-Whitwell-Cowper stoves. Fuel, raw coal and coke; ores, native, from the furnace property, and Lake Superior; product, foundry and forge pig iron; total annual capacity, 45,000 gross tons. William E. Davies, President, A. Lanfear Norrie, Vice-President, and A. Gordon Norrie, Secretary and Treasurer, New York. Address all inquiries concerning the furnaces to William E. Davies.—*Active in 1896; idle on March 1, 1898, and for lease.*

Number of bituminous coal or coke furnaces in the Hocking Valley: 6 stacks.

LAKE COUNTIES—COKE.

Cleveland Rolling Mill Company, Western Reserve Building, Cleveland, Cuyahoga county. Three stacks: Central Furnaces, two stacks, one 75 x 20, built in 1881-2 and rebuilt in 1895-6; three Whitwell stoves; and one, 80 x 20, built in 1887; four fire-brick stoves. Newburgh Furnace, 65 x 16, built in 1872 and remodeled in 1886; rebuilt in 1895-6. Fuel, coke; ore, Lake Superior; product, No. 1 Bessemer pig iron; total annual capacity, 230,000 gross tons.—*Active in 1898. See Rolling Mills and Steel Works in Ohio, (Lake Counties District.)*

Emma Furnace, Union Rolling Mill Company, Cleveland, Cuyahoga county. Works and office at Newburgh, in the city of Cleveland. One stack, 72 x 17, built in 1872; remodeled in 1882-3, 1890-1, and 1896; three Ford & Moncur stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, foundry, and forge pig iron; annual capacity, 80,000 gross tons. Brand, "Emma." H. A. Fuller, General Manager; Willard Fuller, Superintendent.—*Active in 1898. See Rolling Mills in Ohio, (Lake Counties District.)*

River Furnace, River Furnace and Dock Company, lessee, Perry-Payne Building, Cleveland, Cuyahoga county. One stack, 65 x 16½, built in 1879 and remodeled in 1889 and 1895; two Foote stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 72,000 gross tons. Brands, "River," "Douglas," and "Lincoln." James Corrigan, President; Stevenson Burke, Vice-President; Price McKinney, Secretary and Treasurer; Charles B. Fowler, Superintendent. Selling agents, Corrigan, McKinney & Co., Cleveland; Rogers, Brown & Co., Buffalo, Cleveland, Cincinnati, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh. Owned by the Cleveland Iron Company.—*Active in 1898.*

BUILDING.

Lorain (The) Steel Company, Lorain, Lorain county. Building two stacks at Lorain, to be 100 x 22, and to be equipped with 8 Cowper-Roberts fire-brick stoves, 100 x 21; fuel, Connellsville coke; ores, Lake Superior and Mesabi; product, Bessemer pig iron; estimated annual

capacity, 350,000 gross tons. Brand, "Lorain." A. J. Moxham, President.

Number of coke furnaces in the Lake Counties: 5 completed stacks and 2 stacks building.

MISCELLANEOUS—BITUMINOUS COAL OR COKE.

Ætna-Standard Iron and Steel Company, Bridgeport. Three stacks, two owned and one leased. Mingo Furnaces, at Mingo Junction, Jefferson county, two stacks: No. 1, 75 x 17, built in 1871 and rebuilt in 1886; No. 2, 75 x 17, built in 1872 and rebuilt in 1886; four Gordon-Whitwell-Cowper stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity of each furnace, 80,000 gross tons; company has sufficient machinery to run one furnace only at a time. Contracts have been placed for part of the machinery necessary to operate both furnaces at Mingo Junction; Furnace No. 2 may be raised and its capacity increased. (Operated by the Junction Iron and Steel Company until its consolidation with the Ætna-Standard Iron and Steel Company on July 1, 1897.) Jefferson Furnace, at Steubenville, Jefferson county, leased from the Jefferson Iron Works: one stack, 78 x 18½, built in 1865 and rebuilt in 1889; four Gordon-Whitwell-Cowper stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 80,000 gross tons.—*Active in 1898. See Rolling Mills and Steel Works in Ohio, (Ohio River Counties District.) See Tinsplate Works in Ohio.*

Bellaire Furnaces, Bellaire Steel Company, Bellaire, Belmont county. Two stacks: one, 75 x 17, built in 1873, blown in September 22, 1873, and rebuilt in 1886; and one, 75 x 18, built in 1894-5 and blown in March 7, 1895; eight Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron consumed in the manufacture of soft Bessemer steel; total annual capacity, 180,000 gross tons. (Name of company changed from Bellaire Nail Works to Bellaire Steel Company in February, 1896.)—*Active in 1898. See Rolling Mills and Steel Works in Ohio, (Ohio River Counties District.)*

Dover Furnace, The Penn Iron and Coal Company, Canal Dover, Tuscarawas county. One stack, 75 x 16½, built in 1854 and blown in 1855; rebuilt in 1878-9 and remodeled and enlarged in 1895; three Cowper-Roberts fire-brick stoves, 70 x 18; fuel, coke; ores, blackband and Lake Superior; specialties, "Tuscarawas" blackband, "Dover" all-lake ore strong foundry, and Bessemer and basic open-hearth pig iron; annual capacity, 100,000 gross tons. Brands, "Tuscarawas" and "Dover" for foundry pig iron. J. P. Burton, President, Massillon; S. W. Croxton, Treasurer, General Manager, and Selling Agent, Cleveland; H. S. Ream, Secretary, Canal Dover.—*Active in 1898.* King, (The) Gilbert, and Warner Company, Columbus, Franklin county. Two stacks: Franklin Furnace, 75 x 17½, completed in Novem-

ber, 1873; rebuilt in 1892 and 1895; three Massicks & Crooke stoves, each 65 x 18; fuel, Pocahontas coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 90,000 gross tons; brand, "Franklin." Steelton Furnace, 80 x 18, built in 1897 and first blown in August 12, 1897; three Massicks & Crooke stoves, each 75 x 19½; fuel, Pocahontas and New River coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 120,000 gross tons; brand, "Columbus." (Moxahala Furnace, at Moxahala, Perry county, Ohio, one stack, 70 x 16½, built in 1877-8, abandoned and dismantled in 1897.)—*Active in 1898. See Rolling Mills and Steel Works in Ohio, (Interior Counties District.)*

Martin's Ferry Furnace, Wheeling Steel and Iron Company, Wheeling, West Virginia. Furnace at Martin's Ferry, Belmont county. One stack, 60 x 14, built in 1866; two iron stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 30,000 gross tons.—*Active in 1898. See Furnaces and Rolling Mills and Steel Works in West Virginia.*

Ohio Iron Company, Zanesville, Muskingum county. One stack, 75 x 16, built in 1870-1, blown in September 7, 1871, and rebuilt in 1883; three Whitwell stoves, each 65 x 17, and one Kennedy stove, 70 x 18; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer, foundry, and forge pig iron; annual capacity, 65,000 gross tons. Brand, "Ohio Iron Co." (Formerly called Zanesville Furnace.)—*Active in 1898. See Rolling Mills and Steel Works in Ohio, (Interior Counties District.)*

Steubenville Furnace, Riverside Iron Works, Wheeling, W. Va. Furnace at Steubenville, Jefferson county. One stack, 75 x 16, built in 1872 and rebuilt in 1886 and 1890; three Massicks & Crooke stoves; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 75,000 gross tons. Brand, "Riverside."—*Active in 1898. See Riverside Furnace and Rolling Mills and Steel Works in West Virginia.*

Number of bituminous coal or coke furnaces in Ohio outside of the Mahoning Valley, Hocking Valley, Lake Counties, and Hanging Rock region: 11 stacks.

HANGING ROCK—BITUMINOUS COAL OR COKE.

Belfont Furnace, Belfont Iron Works Company, Ironton, Lawrence county. One stack, 66 x 16, built in 1868 and rebuilt in 1895; three Whitwell stoves; fuel, Pocahontas and West Virginia coke; ores, Lake Superior and native; product, Bessemer, foundry, and forge pig iron; annual capacity, 50,000 gross tons. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis.—*Active in 1898. See Rolling Mills in Ohio, (Ohio River Counties District.)*

Etna Iron Works, Ironton Coal and Iron Company, Ironton, Lawrence county. Two stacks: Alice Furnace, 86 x 18, first blown in September 13, 1875; and Blanche, (alternate stack,) 86 x 18, first blown in in 1888; four Whitwell stoves; fuel, New River coke; ores, Hanging Rock, Lake Superior, Virginia, and Kentucky; product, chiefly foundry pig iron; total annual capacity, 30,000 gross tons. Machinery is sufficient for operating only one furnace at a time. Alice is now being repaired. J. H. Lee, President, Baltimore; George L. Estabrook, Jr., Secretary, Bullitt Building, Philadelphia; George N. Gray, Agent, Ironton.—*Idle for several years; Alice may be blown in shortly.*

Fulton Furnace, Globe Iron Company, Jackson, Jackson county. One stack, 50 x 13½, built in 1868 and rebuilt in 1886-7; one iron pipe stove; fuel, ¾ raw coal and ¼ coke; ore, native; product, high-silicon softeners, from 5 to 12 per cent.; annual capacity, 7,500 gross tons. Brand, "Globe." Furnace will be remodeled and enlarged in 1898. (Huron Furnace, 49 x 13, abandoned.) Eben Jones, President; J. E. Jones, Secretary and Treasurer; E. Crandall, General Superintendent. Selling agents, Matthew Addy & Co., Cincinnati; F. A. Goodrich & Co., Detroit; W. R. Thomas, New York.—*Active in 1898.*

Hamilton Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. One stack, 65 x 16, built in 1883 and first blown in in March, 1886; three Whitwell stoves; fuel, Pocahontas coke; ores, native block and limestone and Lake Superior; product, soft foundry pig iron; annual capacity, 25,000 gross tons. Brand, "Hamilton." E. B. Willard, President; James Bull, Secretary and Treasurer. Selling agents, Matthew Addy & Co., Cincinnati; James Collord & Co., Pittsburgh.—*Active in 1898.*

Lawrence Furnace, Lawrence Furnace Company, Culbertson, Lawrence county. Main office, Ironton. One stack, 65 x 13, built in 1889-90, using machinery removed from Waldorf Furnace, West Va.; blown in in March, 1891; two Gordon-Whitwell-Cowper stoves; fuel, raw coal and West Virginia coke; ores, native and Bath county, Ky.; product, high-silicon and strong Scotch foundry pig iron; annual capacity, 10,000 gross tons. Brands, "Lawrence" and "Pencost," the latter for 8 per cent. silicon. John Peters, Jr., President, Manager, and Selling Agent; Charles Peters, Vice-President; George Peters, Secretary. Selling agents, F. A. Goodrich & Co., Detroit; The Bourne-Fuller Company, Cleveland.—*Active in 1896.*

Sarah Furnace, Kelly Nail and Iron Company, lessee, Ironton, Lawrence county. One stack, 60 x 14, built in 1877, blown in March 18, 1878, and remodeled in 1886 and 1891; three Whitwell stoves; fuel, West Virginia coke; ore, Lake Superior; product, Bessemer pig iron; annual capacity, 40,000 gross tons. Brand, "Sarah." Owned by the Richey Iron and Steel Company.—*Active in 1898. See Kelly Nail Works in Ohio, (Ohio River Counties District.)*

Star Furnace, Star Furnace Company, Jackson, Jackson county. One stack, $55 \times 14\frac{1}{2}$, built in 1866 and rebuilt in 1879 and 1897; two iron pipe stoves; fuel, $\frac{3}{4}$ native raw coal and $\frac{1}{4}$ West Va. coke; ores, native limonite and block; product, ferro-silicon and Nos. 1 and 2 silvery gray foundry pig iron; annual capacity, 11,000 gross tons. Brand, "Star." B. Kahn, President; C. O. Brown, Secretary; L. V. Brown, Manager. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis.—*Active in 1898.*

Tropic Furnace, Tropic Iron Company, Jackson, Jackson county. One stack, 47×13 , built in 1872-3 and rebuilt in 1879; two Pollock stoves; hot blast; fuel, raw coal; ore, native block; product, high-silicon foundry pig iron; annual capacity, 6,500 gross tons. Brand, "Tropic." Furnace will probably be rebuilt in 1898. H. L. Chapman, President; J. C. Jones, Secretary and Treasurer; Miles Jones, Superintendent. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis.—*Active in 1897.*

Wellston (The) Iron and Steel Company, Wellston, Jackson county. Three stacks: Wellston Furnaces, two stacks: No. 1, $52\frac{1}{2} \times 13$, built in 1874-5 and remodeled in 1879 and 1889; No. 2, $52\frac{1}{2} \times 13$, built in 1874-5 and remodeled in 1889; one Thomas and two Pollock stoves. Milton Furnace, one stack, $62 \times 12\frac{1}{2}$, built in 1873-4 and first blown in June 6, 1874; abandoned in 1895; rebuilt and remodeled in 1896; three Whitwell stoves. Fuel, Kanawha and Pocahontas coke; ores, local and Lake Superior; product, strong foundry, red-short mill, and Ohio Scotch (6, 8, and 10 per cent. silvery) pig iron; total annual capacity, 60,000 gross tons. J. C. Clutts, President and General Manager; H. S. Willard, Vice-President; H. A. Marting, Secretary and Treasurer. Sole sales agents, Miller, Wagoner, Fieser & Co., Columbus, Chicago, and St. Louis.—*Active in 1898.*

Number of bituminous coal and coke furnaces in the Hanging Rock region of Ohio: 12 stacks.

HANGING ROCK—CHARCOAL.

Bloom Furnace, Clare Iron Company, Bloom Switch, Scioto county. One stack, 33×11 , built in 1832 and rebuilt in 1846; burned December 7, 1887, and rebuilt in the spring of 1888; hot blast; open top; ore, hematite; product, No. 1 foundry pig iron; annual capacity, 2,700 gross tons. Brand, "Bloom." J. D. Clare, President and Treasurer; J. H. Simmons, Vice-President; E. H. Clare, Secretary and Manager. Selling agent, J. D. Clare, Portsmouth.—*Active in 1897.*

Centre Furnace, Centre Mining and Manufacturing Company, Ironton,

Lawrence county. One stack, $40 \times 10\frac{1}{2}$, built in 1837; cold and warm blast; open top; ore, native limestone; product, car-wheel and extra strong machinery iron; annual capacity, 4,500 gross tons. I. A. Kelly, President; Lindsey Kelly, Vice-President; O. Richey, Secretary. Leased by Lindsey Kelly. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis.—*Idle since 1893.*

Hecla Furnace, Hecla Iron and Mining Company, Hecla P. O., near Ironton, Lawrence county. One iron stack, $53 \times 10\frac{1}{2}$, built in 1887–90 to take the place of a stone stack built in 1833; cold blast; ores, local siderite and limonite calcined in three ovens with wood and charcoal after being crushed; limestone calcined with charcoal braise in oven before using; product, iron for car-wheels, chilled rolls, and machinery; annual capacity, 7,500 gross tons. Brand, "Hecla." Stops on Sunday. H. S. Neal, President; Charles Campbell, General Manager, Secretary, and Treasurer; John Thielen, Furnace Manager. Selling agents, James Collord & Co., Pittsburgh; Rogers, Brown & Co., Cincinnati; Rogers, Brown & Warner, Philadelphia.—*Active in 1896.*

Madison Furnace, Clare, Duduit & Co., Rempel, Jackson county. One stack, $37 \times 9\frac{1}{2}$, built in 1854; hot blast; open top; ore, native red limestone roasted in two ovens and charged hot; product, No. 1 foundry pig iron; annual capacity, 3,150 gross tons. Brand, "Madison." E. H. Clare, Financial Manager, Portsmouth, Ohio; A. J. Duteil, General Superintendent and Secretary, Rempel. Selling agents, J. D. Clare, Portsmouth; Miller, Wagoner, Fieser & Co., Columbus; James Collord & Co., Pittsburgh; C. R. Baird & Co., Bullitt Building, Philadelphia.—*Active in 1897.*

Mount Vernon Furnace, The Campbell Iron Company, Campbell, Lawrence county. Telegraph address, Mount Vernon Furnace; railroad station, Moulton; United States Express station, Mount Vernon Furnace. One stack, $32 \times 10\frac{1}{2}$, built in 1833; open top; ore, native hematite; product, warm-blast car-wheel pig iron; annual capacity, 3,500 gross tons. Brand, "Mt. Vernon." J. H. Moulton, President and Selling Agent, Ironton; J. W. Campbell, Manager, at the furnace. Selling agents, Rogers, Brown & Co., Cincinnati; C. R. Baird & Co., Philadelphia.—*Idle since 1895.*

Olive and Buckhorn Furnaces, McGugin & Co., Olive Furnace P. O., Lawrence county. Telegraph address, Mt. Vernon Furnace, care of C. H. & D. Ry. Furnaces situated on the Cincinnati, Hamilton, and Dayton Railway. Two stacks: Olive Furnace, 40×10 , built in 1846 and remodeled in 1890; Buckhorn Furnace, 38×10 , built in 1833 and rebuilt in 1852. Open tops; hot or cold blast; ore, native limestone; product, foundry and car-wheel pig iron; total annual capacity, 8,000 gross tons. Brands, "Olive" and "Buckhorn." W. H.

McGugin, Superintendent. Selling agents, Rogers, Brown & Co., Buffalo, New York, Boston, Cincinnati, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis.—*Olive active in 1898; Buckhorn idle.*

Vesuvius Furnace, The Vesuvius Iron Company, lessee, Pedro, Lawrence county. One stack, 33 x 10½, built in 1832; rebuilt in 1886; cold blast; open top; ore, native limestone; product, pig iron suitable for the manufacture of car-wheels and chilled rolls; annual capacity, 3,000 gross tons. Brand, "Vesuvius." W. C. Amos, President and Treasurer; W. E. Campbell, Vice-President; Horace L. Amos, Secretary and Manager. Selling agents, James Collord & Co., Pittsburgh. Owned by the Ironton Coal and Iron Company.—*Active in 1897.*

Number of charcoal furnaces in the Hanging Rock region: 8 stacks.

Total number of furnaces in Ohio: 55 completed stacks, 2 stacks building, and 2 stacks projected.

ILLINOIS.

COKE.

Calumet Furnace, Calumet Iron and Steel Company, Rookery Building, Chicago. Works at South Chicago, Cook county. One stack, 80 x 18, built in 1880 and blown in in 1881; one Massicks & Crooke and three Foote stoves; fuel, Connellsville coke; ore, Lake Superior; product, foundry and Bessemer pig iron; annual capacity, 75,000 gross tons. Brand, "Calumet." I. T. Hartz, Receiver, Chicago.—*Active in 1896. See Rolling Mills and Steel Works in Illinois, (Calumet Works.)*

Illinois Steel Company, Rookery Building, Chicago, Cook county. Fifteen stacks in Illinois: North Works, at Chicago, at the foot of Wabansia avenue, on the north branch of the Chicago river, have two stacks: Nos. 1 and 2, each 66 x 16, built in 1869; six fire-brick stoves of various types; product, chiefly spiegeleisen and basic open-hearth and foundry pig iron; annual capacity, 70,000 gross tons. South Works, at South Chicago, have eight stacks: Nos. 1, 2, 3, and 4, each 75 x 19, built in 1880-1; sixteen Siemens-Cowper-Foote stoves; and Nos. 5, 6, 7, and 8, each 85 x 20, built in 1890-1; sixteen Massicks & Crooke stoves; product, Bessemer pig iron; annual capacity, 850,000 gross tons. Joliet Works, at Joliet, Will county, have three stacks, each 80 x 20: Nos. 1 and 2, built in 1873 and rebuilt in 1891, and No. 3, built in 1889-90; four Siemens-Cowper-Foote, four Massicks & Crooke, and four Whitwell-Gordon stoves; product, Bessemer pig iron; annual capacity, 300,000 gross tons. Union Works, at Chicago, at Ashland ave. and Thirty-first st., on the south branch of the Chicago river, have two stacks: Nos. 3 and 4, each 73 x 15 ft. 4 in., built in 1881 and rebuilt in 1889; seven Siemens-Cowper-Foote stoves; product, spiegeleisen, ferromanganese, and Bessemer pig iron;

annual capacity, 130,000 gross tons. (Two stacks at the Union Works, Nos. 1 and 2, each 72 x 14, built in 1869, abandoned in 1895.) Fuel, Connellsville and Pocahontas Flat-Top coke; ores, Lake Superior, Gogebic, and Minnesota for Bessemer pig iron, and foreign, Southern, and Western for spiegeleisen and ferromanganese. Total annual capacity of all the furnaces, 1,350,000 gross tons.—*Active in 1898. See Coke Furnaces in Wisconsin (Milwaukee Works) and Rolling Mills and Steel Works in Illinois and Wisconsin.*

Iroquois Furnace, Iroquois Furnace Company, Rookery Building, Chicago. Furnace at Ninety-fifth st., South Chicago, Cook county. One stack, 80 x 17, built in 1890-1 and blown in September 21, 1891; four Cowper-Kennedy stoves; fuel, coke; ore, Lake Superior; product, foundry and Bessemer pig iron; annual capacity, 75,000 gross tons. Brands, "Iroquois" for strong iron, "Sterling Scotch" for soft iron, "Peerless" for high-silicon soft iron, and "Malleable Bessemer" for iron suitable for malleable work. Hay Walker, Jr., President, and T. H. Given, Treasurer, Pittsburgh; Charles F. Forster, Secretary and General Manager, Rookery Building, Chicago; Jerome Zink, Superintendent, South Chicago. Selling agents, Forster, Waterbury & Co., Rookery Building, Chicago.—*Active in 1898.*

Number of furnaces in Illinois: 17 coke stacks. No charcoal stacks.

MICHIGAN.

CHARCOAL.

Antrim Iron Company, Mancelona, Antrim county. General office, Grand Rapids. One stack, 60 x 10½, built in 1887-8, blown in in February, 1888, and rebuilt in 1895; hot blast; charcoal supplied by 80 round brick kilns of an average capacity of 65 cords each; wood cut from company's land; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 30,000 gross tons. Brand, "Antrim." (One stack, 48 x 10, blown in December 25, 1882, abandoned and dismantled.) T. J. O'Brien, President; J. M. Barnett, Vice-President; J. C. Holt, Secretary and Treasurer; Kenneth Robertson, Manager, Mancelona. Selling agents, The Superior Charcoal Iron Company, Grand Rapids.—*Active in 1898.*

Detroit Iron Furnace Company, 804 Union Trust Building, Detroit. One stack, 50 x 10½, built in 1870; changed from bituminous coal to charcoal in 1879; hot blast; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 20,000 gross tons. Brand, "D. I. F." James McMillan, President; Hugh McMillan, Vice-President; W. C. McMillan, Secretary and Treasurer.—*Idle since 1892.*

Elk Rapids Furnace, Elk Rapids Iron Company, Elk Rapids, Antrim county. One stack, 58 x 10½, first put in blast in July, 1873; hot blast; ore, Lake Superior entirely; specialties, Nos. 3 and 4 pig iron

for car-wheels and malleable castings; annual capacity, 25,000 gross tons. Brand, "Elk Rapids." Charcoal is made in 20 round and 25 rectangular brick kilns, holding, respectively, 60 and 100 cords each; chemical works are connected with them. N. K. Fairbank, President, Chicago; H. B. Lewis, Vice-President, Secretary, and General Manager, and Charles Durkee, Treasurer, Elk Rapids. Selling agents, The Superior Charcoal Iron Company, Grand Rapids.—*Active in 1898.*

Excelsior Furnace, Charles H. Schaffer, Marquette. Furnace at Ishpeming, Marquette county. One stack, 50 x 10, built in 1872, burned and rebuilt in 1880, and again rebuilt in 1890; one iron stove; hot blast; ore, Lake Superior; product, Bessemer, foundry, car-wheel, and malleable pig iron; annual capacity, 27,500 gross tons. Brand, "Excelsior." W. H. Nelson, Superintendent. Selling agents, Pickands, Brown & Co., Chicago; Rogers, Brown & Co., Buffalo, New York, Boston, Cleveland, and Cincinnati; Rogers, Brown & Warner, Philadelphia and Pittsburgh.—*Active in 1898.*

Fruitport Furnace, The Spring Lake Iron Company, Fruitport, Muskegon county. One stack, 56 x 11, built in 1879-80 and remodeled in 1891; hot blast; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; annual capacity, 29,000 gross tons. Brand, "Spring Lake." Irving M. Bean, President, C. F. Ilsley, Vice-President, and Samuel Marshall, Treasurer, Milwaukee; J. C. Ford, Secretary and General Superintendent, Fruitport. Sales made by the company.—*Active in 1898.*

Gaylord Iron Company, (successor to Detroit and Lake Superior Iron Manufacturing Company,) Detroit, Wayne county. One stack, 56 x 9½, built in 1857 and first put in blast March 16, 1857; remodeled in 1889; warm blast; ores, Lake Superior specular, magnetic, and hematite; product, pig iron especially adapted for malleable castings and car-wheels; annual capacity, 12,000 gross tons. Brand, "G. I. Co. DET." Charles A. Kent, President; William M. Gaylord, Vice-President, Treasurer, and General Manager; Frank B. Gaylord, Secretary; Nicholas Woods, Local Manager. Sales made by the company.—*Active in 1898.*

Martel Furnace, St. Ignace, Mackinac county. One stack, 53 x 10½, first put in blast August 15, 1881; two Whitwell stoves, each 60 x 15; ore, Lake Superior; product, car-wheel pig iron; annual capacity, 21,000 gross tons. Brand, "Martel." Owned by William A. Galbraith, Erie, and Arnold A. Plumer, Franklin, Pa.—*Idle since 1892.*

Newberry Furnace Company, Newberry, Luce county. Furnace and general office at Newberry. One stack, 52½ x 10, built in 1882-3 and blown in in May, 1883; rebuilt in 1892; closed top with patent charger; four iron stoves; warm blast; water jackets; ores, hard and soft Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 27,000 gross tons. Brand, "Vulcan." The charcoal is

made at the furnace in 64 kilns. James McMillan, President, Truman H. Newberry, Vice-President, and William C. McMillan, Treasurer, Detroit; Claude W. Case, Secretary and Manager, Newberry. Selling agents, William F. Jarvis & Co., Detroit.—*Idle since 1894.*

Northern Furnace Company, Marquette. Furnace at Chocoday, Marquette county. One stack, 50 x 10½, built in 1860 and rebuilt in 1890; hot blast; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; annual capacity, 25,000 gross tons. Brand, "Northern." J. M. Longyear, President; N. M. Kaufman, Vice-President; J. G. Reynolds, Secretary; J. M. Wilkinson, Treasurer; F. B. Spear, Manager. Selling agents, F. A. Goodrich & Co., Detroit.—*Idle for several years.*

Peninsular Furnace, The Peninsular Iron Company, Detroit, Wayne county. One stack, 42 x 9½, built in 1863 and put in blast in February, 1864; warm blast; open top, covered by a plate when not filling; ore, Lake Superior exclusively; product, car-wheel iron, iron for special purposes, and malleable and low-phosphorus pig iron; annual capacity, 10,000 gross tons. Brand, "P. I. Co., Det." Theodore H. Eaton, President; Robert Leete, Vice-President; Solon Burt, Secretary and Treasurer; McKinstry Burt, Assistant Secretary and Treasurer. Sales made by the company.—*Active in 1898.*

Pioneer Furnace, The Cleveland-Cliffs Iron Company, Mercantile Bank Building, Cleveland, Ohio. Furnace at Gladstone, Delta county. One stack, 60 x 12, built in 1895-6 and blown in April 16, 1896; two hot blast stoves; ores, Lake Superior red specular and soft hematites; specialties, malleable, boiler-tube, and car-wheel pig iron; annual capacity, 45,000 gross tons. Brand, "Pioneer." (Pioneer Furnaces, at Negaunee, two stacks, abandoned in 1895.) William G. Mather, President and Treasurer, J. H. Sheadle, Secretary, and R. C. Mann, Auditor, Mercantile Bank Building, Cleveland, Ohio; Austin Farrell, Manager, Gladstone. Selling agents, The Superior Charcoal Iron Company, Grand Rapids.—*Active in 1898.*

Union Iron Company, Jefferson avenue east, Detroit, Wayne county. One stack, 46 x 10, built in 1871-2 and blown in in July, 1872; warm blast; ore, Lake Superior; specialties, malleable and car-wheel pig iron; annual capacity, 13,500 gross tons. Brand, "U. I. Co., Det." Lee Burt, President; William Gerhauser, Secretary and Manager; W. C. Burt, Treasurer. Selling agents, F. A. Goodrich & Co., Detroit.—*Active in 1897.*

Weston Furnace, Weston Furnace Company, Manistique, Schoolcraft county. One stack, 58 x 12, built in 1890-1 and blown in March 4, 1891; three iron stoves; warm blast; blast heated to 825 degrees; ore, Lake Superior; product, car-wheel and malleable pig iron; annual capacity, 34,000 gross tons. Brand, "Champion." A chemical plant for the recovery of by-products is connected with the furnace. Abijah Weston, President; M. H. Quick, Vice-President and Treas-

urer; H. Duvall, Secretary and General Manager. Sales made by the company.—*Active in 1897.*

Number of furnaces in Michigan: 13 charcoal stacks. No coke stacks.

WISCONSIN.

COKE.

Mayville Furnace, The Northwestern Iron Company, Pabst Building, Milwaukee. Furnace at Mayville, Dodge county. One stack, 76 x 17, built in 1848 as a charcoal furnace, rebuilt in 1872 and 1884, and remodeled and enlarged in 1887 to use coke; again remodeled and enlarged in 1896; two Cowper-Foote stoves, each 60 x 18; fuel, Connellsville coke; ores, Menominee, Gogebic, and local; product, Bessemer and foundry pig iron; annual capacity, 60,000 gross tons. Brands, "Sidney" and "Gertrude." Irving M. Bean, President; James C. Spencer, Vice-President; W. K. Packman, Secretary; Charles F. Ilsley, Treasurer; Thomas F. Witherbee, Superintendent, Mayville. Selling agents, Pickands, Brown & Co., Chicago.—*Active in 1898.*

Milwaukee Works, Illinois Steel Company, Rookery Building, Chicago. Two stacks at Milwaukee, Milwaukee county: Bay View Furnaces, Nos. 1 and 2, each 66 x 16, built in 1870-1; six Massicks & Croke stoves; fuel, coke; ores, Lake Superior, Gogebic, and Iron Ridge; product, basic, Bessemer, and foundry pig iron; total annual capacity, 130,000 gross tons.—*Active in 1898. See Furnaces in Illinois and Rolling Mills and Steel Works in Illinois and Wisconsin.*

Minerva Furnace, Minerva Iron Company, 71 Colby and Abbot Building, Milwaukee. Furnace at Milwaukee. One stack, 56 x 14½, built and put in blast in the spring of 1873; rebuilt in 1892; two Hugh Kennedy hot-blast stoves, 18 x 60; fuel, Connellsville coke; ore, Lake Superior; product, foundry pig iron; annual capacity, 40,000 gross tons. Brand, "Minerva." S. A. Harrison, President; R. W. Pierce, Vice-President; William Bloodgood, Secretary and Treasurer.—*Active in 1896; idle on March 1, 1898, and for sale or lease.*

Number of coke furnaces in Wisconsin: 4 stacks.

CHARCOAL.

Eagle Furnace, F. S. Wright, Newark, Ohio. Furnace at Spring Valley, Pierce county. One stack, 65 x 13, built in 1892-3, using machinery from the Fannie Furnaces, at Shawnee, Ohio; first blown in February 20, 1894; two 60-pipe Pollock stoves; ore, brown hematite mined 1½ miles from the furnace; annual capacity, 22,000 gross tons.—*Idle since 1895.*

Hinkle Furnace, Ashland Iron and Steel Company, Ashland, Ashland county. One stack, 60 x 12, built in 1887-8 and blown in in March, 1888; remodeled in 1897; closed top; two Whitwell stoves; hot blast; ore, Gogebic hematite; product, foundry, car-wheel, and malleable

pig iron; annual capacity, 45,000 gross tons. Brand, "Hinkle." A. H. Hinkle, President; W. H. Hinkle, Secretary and Treasurer; Lewis E. Dunham, Manager. Selling agents for the United States and abroad, Rogers, Brown & Co., Boston, New York, Buffalo, Cincinnati, Cleveland, and Chicago; Rogers, Brown & Warner, Philadelphia and Pittsburgh; Rogers, Brown & Meacham, St. Louis.—*Active in 1898.*

Number of charcoal furnaces in Wisconsin: 2 stacks. Total number of furnaces in Wisconsin: 6 stacks.

MINNESOTA.

COKE.

West Duluth Furnace, Duluth Iron and Steel Company, Duluth. Furnace at West Duluth, St. Louis county. One stack, $75 \times 16\frac{1}{2}$, built in 1889-90 and rebuilt in 1893; three Gordon-Whitwell-Cowper stoves; fuel, coke, made principally at Duluth from Connellsville coal; ore, Mesabi; product, principally Bessemer pig iron; annual capacity, 50,000 gross tons. R. S. Munger, President; Victor Stearns, Secretary and Treasurer.—*Idle since 1893 and for sale or lease.*

Number of furnaces in Minnesota: 1 coke stack.

MISSOURI.

COKE.

Missouri Furnaces, McNair & DeCamp, lessees, Fullerton Building, St. Louis. Two stacks, located at South St. Louis, built in 1869 and blown in in 1870; No. 1, 58×15 , remodeled in 1887; No. 2, 76×15 , remodeled in 1887 and rebuilt in 1895; one Massicks & Crooke and two Gordon-Whitwell-Cowper stoves; fuel, Connellsville coke; ores, Iron Mountain and Cherry Valley; product, Bessemer, basic open-hearth, malleable Bessemer, and foundry pig iron; total annual capacity, 70,000 gross tons. Brands, "Missouri" and "Carondelet." One furnace only operated at a time. Selling agents, DeCamp Brothers & Yule, St. Louis. Owned by the Missouri Furnace Company, of which Edwin C. Cushman is President, J. D. Filley, Vice-President, Charles A. McNair, Secretary and Treasurer, and F. F. Amsden, Superintendent.—*Active in 1898.*

Number of coke furnaces in Missouri: 2 stacks.

CHARCOAL.

Sligo Furnace Company, Sligo, Dent county. Branch office, 411 Olive st., St. Louis. One stack, 55×11 , built in 1880 and rebuilt in 1891; warm or hot blast; ores, blue specular and red oxide mined near the furnace; product, Bessemer, foundry, car-wheel, and malleable pig iron; annual capacity, 20,000 gross tons. Brand, "Sligo." H. A. Crawford, President and Treasurer, St. Louis; E. L. Foote, Vice-

President, Secretary, and Superintendent, Sligo. Sales made by the company from its St. Louis office.—*Active in 1898.*

Number of charcoal furnaces in Missouri: 1 stack. Total number of furnaces in Missouri: 3 stacks.

COLORADO.

COKE.

Colorado (The) Fuel and Iron Company, Pueblo, Pueblo county. General office, Boston Building, Denver; Chicago office, 940 Rookery Building; Salt Lake office, 202 Auerbach Building. Three stacks: one, 75 x 17, built in 1880-1 and blown in September 7, 1881; one, 75 x 17, completed in 1887; both rebuilt and modernized in 1893; and one, 75 x 17, built in 1890-1; ten Siemens-Cowper-Cochrane stoves; fuel, coke, produced at the company's ovens at Sopris and El Moro; ores, limonite and magnetite from the company's mines at Orient and Calumet; product, Bessemer, foundry, Scotch, and mill pig iron, and spiegeleisen; total annual capacity, 200,000 gross tons. General Sales Agent, A. C. Cass, Denver.—*Active in 1898. See Rolling Mills and Steel Works in Colorado.*

Number of furnaces in Colorado: 3 coke stacks.

OREGON.

CHARCOAL.

Oswego Furnace, Oregon Iron and Steel Company, Oswego, Clackamas county. Main office and telegraph address, 106 Third st., Portland. One stack, 60 x 13, built in 1888 and first blown in in October, 1888; three Whitwell stoves; hot blast; iron shell; charcoal made exclusively from fir; ore, 35 per cent. brown hematite, worked part raw and part roasted, using a Davis & Colby kiln; product, No. 1 foundry pig iron; annual capacity, 15,000 gross tons. Brand, "Oregon." The company owns and operates a cast-iron pipe foundry at Oswego. William M. Ladd, President; Martin Winch, Vice-President; William B. Addy, Secretary and General Superintendent.—*Furnace idle since 1894; foundry in operation.*

Number of furnaces in Oregon: 1 charcoal stack.

UNITED STATES.

Total number of furnaces in the United States in April, 1898, which were then active or may some time be put in blast: 420 stacks. Of these 79 use charcoal as fuel, 94 use anthracite coal or mixed anthracite coal and coke, and 247 use coke or raw bituminous coal. In addition there were 4 furnaces building and 8 furnaces projected, some of which were partly built and work temporarily suspended.

Total number of furnaces on December 1, 1895, 469 stacks.

FURNACES LONG INACTIVE OR WHICH HAVE RECENTLY BEEN ABANDONED.

Some of the furnaces named in this list have been inactive for several years, but are still equipped with fair machinery, and circumstances may at some time favor their revival; others, however, have been permanently abandoned and will never again make iron. When companies or individuals are mentioned it is understood that they were the owners at the time the furnaces were first placed in this list. A list of furnaces which have been abandoned for many years will be found in the editions of the Directory for 1892, 1894, and 1896.

MASSACHUSETTS.

CHARCOAL.

Lanesborough Furnace, Gilbert West, Pittsfield. Furnace at Lanesborough, Berkshire county. One stack, 33 x 9½, built in 1847, burned in 1882, and rebuilt in 1882-3; idle since the spring of 1889.

CONNECTICUT.

CHARCOAL.

Canaan Furnace, Barnum Richardson Company, Lime Rock, Litchfield county. Furnace at East Canaan, Litchfield county. One stack, No. 2, 32 x 9, built in 1847; likely to be long inactive.

Cornwall Bridge Iron Company, Cornwall Bridge, Litchfield county. One stack, 32 x 9, built in 1833; likely to be long inactive.

Kent Furnace, Kent Iron Company, Kent Furnace P. O., Litchfield county. Telegraph address, Kent. One stack, 34 x 10, built in 1849 and rebuilt in 1884; likely to be long inactive.

NEW YORK.

ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Albany City Iron Works, P. J. McArdle, Albany, Albany county. Two stacks on Van Rensselaer Island, each 60 x 16, built in 1873-4; fuel, anthracite coal and coke; idle for several years and for sale.

Franklin Iron Works, Franklin Iron Manufacturing Company, Franklin Iron Works P. O., Oneida county. One stack, 70 x 15, built in 1871 and remodeled in 1883; fuel, anthracite coal and coke; likely to be long inactive.

Hudson Iron Works, Hudson Iron Company, Hudson, Columbia county.

Two stacks, each 50 x 15, completed and put in operation in 1851; fuel, anthracite coal; dismantled in 1897.

Sterling Iron and Railway Company, 51 Wall st., New York. Furnaces in Orange county. Two stacks: Southfield, 45 x 13, built as a charcoal furnace in 1806 and converted to anthracite in 1868; and Sterling, 42 x 14, built as a charcoal furnace in 1848 and converted to anthracite in 1866; both likely to be long inactive.

CHARCOAL.

Chateaugay Ore and Iron Company, Plattsburgh, Clinton county. Two stacks in Clinton county: Plattsburgh Furnace, at Plattsburgh, 55 x 9½, first blown in in April, 1878, and Standish Furnace, at Standish, 60 x 11, first blown in in February, 1887; likely to be long inactive.

Millerton Iron Company, Irondale, Dutchess county. Telegraph address, Millerton. One stack, 55 x 9½, built in 1885 and blown in in 1886. M. B. Richardson, Lime Rock, Conn., in charge of property for bondholders' committee. Likely to be long inactive.

NEW JERSEY.

ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Andover Iron Works, Andover Iron Company, Phillipsburg, Warren county. Two stacks: No. 2, 75 x 18, and No. 3, 60 x 18, built in 1848 and since remodeled; fuel, anthracite coal and coke; abandoned.

Franklin Iron Company, Franklin Furnace P. O., Sussex county. One stack, 67 x 20½, completed in October, 1873, and blown in January 1, 1874; fuel, anthracite coal and coke; likely to be long inactive.

Warren Furnace, Warren Iron Company, Hackettstown, Warren county. One stack, 56 x 16, built in 1874-5 and put in blast in 1875; fuel, anthracite coal; likely to be long inactive.

PENNSYLVANIA.

ANTHRACITE AND MIXED ANTHRACITE AND COKE.

Bethlehem (The) Iron Company, South Bethlehem, Northampton county. Two stacks: No. 3 Furnace, built in 1868; abandoned. Bingen Furnace, at Bingen, known as No. 7 Furnace, built in 1870; abandoned in 1897. Fuel, anthracite coal and coke.

Columbia Furnaces, Grove Brothers, Danville, Montour county. Two stacks: one, 39 x 14, built in 1840, abandoned; and one, 50 x 14, built in 1860, likely to be long inactive. Fuel, anthracite coal and coke.

Conewago Furnace, Conewago Iron Company, Middletown, Dauphin county. Formerly called Middletown Furnace. One stack, 45 x 11, built in 1853 and rebuilt in 1879; fuel, anthracite coal and coke; likely to be long inactive.

- Coplay Iron Company, Coplay, Lehigh county. Two stacks: one, 55 x 16, built in 1862, open top; and one, 70 x 15, built in 1868 and rebuilt in 1889, closed top; fuel, anthracite coal and coke; idle for several years and likely to be long inactive. In the hands of bondholders; address R. M. Gummere, Bethlehem.
- Duncannon Furnace, The Duncannon Iron Company, Duncannon, Perry county. Office, 122 Race st., Philadelphia. One stack, 60 x 15, built in 1853 and rebuilt in 1880; fuel, anthracite coal and coke; likely to be long inactive.
- Glendon Iron Company, Easton, Northampton county. Three stacks: No. 4 Furnace, at South Easton, built in 1852; torn down in 1890. No. 1 Furnace, at Glendon, near Easton, built in 1844, and No. 5 Furnace, at the same place, built in 1868, dismantled in 1897. Fuel, anthracite coal and coke.
- Keystone Furnace, E. and G. Brooke Iron Company, Birdsboro, Berks county. One stack, 50 x 12, built in 1853; fuel, anthracite coal and coke; dismantled in 1897.
- Lucinda Furnace, Lucinda Furnace Company, Norristown, Montgomery county. One stack, 55 x 14, built in 1856; rebuilt and enlarged in 1888-9; fuel, anthracite coal and coke; likely to be long inactive.
- Lucy Furnace, Lucy Furnace Company, South Bethlehem. Furnace at Glendon, Northampton county. One stack, 65 x 14½, built in 1873 and blown in in 1874; fuel, anthracite coal and coke; dismantled in 1897.
- Marietta Furnaces, Marietta, Lancaster county. Two stacks: one, 50 x 12½, built in 1847 and remodeled in 1880; and one, 38 x 12, built in 1849; idle for a long time.
- Montgomery Furnace, Montgomery Iron Company, Port Kennedy, Montgomery county. One stack, built in 1854 and first blown in in 1856; remodeled in 1863, 1869, and 1890; partly rebuilt in 1893-4 and work suspended; fuel, anthracite coal and coke; abandoned and may be dismantled in 1898.
- Northampton Furnace, Northampton Iron Company, Freemansburg, Northampton county. One stack, 65 x 15, blown in July 17, 1873; dismantled in 1898.
- North Branch Furnace, North Branch Steel Company, Danville, Montour county. Philadelphia office, Twenty-fifth st. and Washington ave. One stack, 42½ x 14, built in 1867; fuel, anthracite coal and coke; abandoned.
- Phoenix Iron Works, Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville, Chester county. Three stacks: No. 1, 59 x 15, built in 1845 and rebuilt in 1871; No. 2, 58¾ x 15, built in 1845 and rebuilt in 1871; No. 3, 59 x 15, built in 1849 and rebuilt in 1890; fuel, anthracite coal and coke; abandoned and dismantled in 1898.

Reading Iron Company, Reading, Berks county. Three stacks: Keystone Furnace, one stack, 50 x 15, built in 1869; and Reading Furnaces, two stacks, each 55 x 14½, built in 1854 and 1873 respectively; fuel, anthracite coal and coke; abandoned in 1897.

Richmond Furnace, Richmond Furnace P. O., Franklin county. One stack, built in 1865 and rebuilt in 1875; abandoned and part of machinery removed.

St. Charles Furnaces, Charles B. Grubb, Lancaster. Furnaces at Columbia, Lancaster county. Two stacks: No. 1, 52 x 14, built in 1853 and dismantled in 1897; and No. 2, formerly known as Henry Clay, built in 1845 and abandoned in 1889; fuel, anthracite coal and coke.

Thomas (The) Iron Company, Hokendauqua, Lehigh county. Main office, Easton. Two stacks at Hokendauqua: No. 2, 60 x 16, built in 1855; abandoned and dismantled in 1894. No. 5, 60 x 17, built in 1873; abandoned in 1897.

BITUMINOUS COAL AND COKE.

Blair Furnace, Cambria Iron Company, Harrison Building, southwest corner Fifteenth and Market sts., Philadelphia. Furnace at Hollidaysburg, Blair county. One stack, 56 x 14, built in 1856 and rebuilt in 1883-4 and in 1892; fuel, Bennington coke; abandoned and likely to be dismantled.

Gap Furnace, Hollidaysburg and Gap Iron Works, Hollidaysburg. Furnace at McKee, Blair county. One stack, 49½ x 11½, built in 1840 and remodeled in 1877 and 1881; fuel, coke. Owned by the first mortgage bondholders, who are represented by Thomas J. Baldrige, of Hollidaysburg. Idle for several years; for sale or lease.

Little Giant Furnace, Neal Brothers, Germania Bank Building, Pittsburgh. Furnace at Allegheny City, Allegheny county. One stack, 40 x 6, built in 1889; fuel, Connellsville coke; abandoned in 1896.

Lucy Furnace, G. W. R. Swoope and Owen J. Cassady, owners, Newton Hamilton, Mifflin county. Furnace at Mount Union, Huntingdon county. One stack, 42½ x 10, built in 1837, rebuilt in 1869, and remodeled in 1887; fuel, Latrobe and Connellsville coke; likely to be long inactive.

Stewart Furnace, Stewart Iron Company Limited, Sharon, Mercer county. One stack, No. 1, 66 x 13, built in 1870 and enlarged in 1882; fuel, Connellsville coke; dismantled in 1896.

CHARCOAL.

Carrick Furnace, H. M. North, Columbia. Furnace at Metal, Franklin county. One stack, 37 x 9, built in 1828 and remodeled in 1880; likely to be long inactive.

Cornwall Furnace, Cornwall Iron Company Limited, Cornwall, Leba-

non county. One stack, 31 x 8, built in 1742; cold blast; likely to be long inactive but in excellent condition.

Eagle Furnace, Curtins & Co., Roland, Centre county. One stack, 29 x 8½, built in 1848; the original furnace was built in 1817, half a mile south of the present site; likely to be long inactive.

MARYLAND.

CHARCOAL.

Principio Furnaces, Whitaker Iron Company, Wheeling, West Va. Furnaces at Principio Furnace P. O., Cecil county. Two stacks: No. 1, 35 x 9, first built in 1723 and rebuilt in 1836; abandoned in 1894. No. 2, 60 x 10, built in 1889-90; likely to be long inactive.

VIRGINIA.

COKE.

Lynchburg Furnace, Lynchburg, Campbell county. One stack, 60 x 11½, first put in blast in December, 1880; remodeled in 1882 and 1884; abandoned in 1897.

CHARCOAL.

Cave Hill Furnace, Wytheville, Wythe county. One stack, 47 x 10, built in 1881-2. S. R. Sayers, Robert Sayers, and George W. Palmer, owners. Idle for several years.

Dora Furnace Company, Pulaski City. Four stacks on Cripple creek, in Wythe county: Beverly Furnace, 33 x 9, built in 1880; Eagle Furnace, 34 x 9, built in 1863 and rebuilt in 1881; Raven Cliff Furnace, 29 x 9, built in 1810 and rebuilt in 1876; Speedwell Furnace, 32 x 9, built in 1873-4. All likely to be long inactive.

Foster's Falls Furnace, Foster's Falls Mining and Manufacturing Company, Foster's Falls, Wythe county. Furnace on the Cripple Creek branch of the N. & W. Railway. One stack, 35 x 8, built in 1881; likely to be long inactive.

Lobdell Car Wheel Company, Wilmington, Delaware. Two stacks: Brown Hill Furnace, at Red Bluff, Wythe county, 40 x 8½, built in 1870-4; rebuilt in 1882. White Rock Furnace, in Smyth county, 5 miles from Rural Retreat Station, Wythe county, 38 x 8½, built in 1875 and blown in August 9, 1875. Both furnaces have been idle for several years and are likely to be long inactive.

Norma Furnace, Clinch Valley Coal and Iron Company, 134 South Fourth st., Philadelphia. Furnace on Cripple creek, Wythe county. One stack, 41 x 13, built in 1880 and blown in March 1, 1882; likely to be long inactive.

Salisbury Furnace, Salisbury Iron Manufacturing Company, Salisbury Furnace P. O., Botetourt county. One stack, 32 x 10, built in 1869.

Eugene Kelly, owner, 45 Exchange Place, New York. Idle since 1883.

Sinking Creek Iron Works, J. Wilcox Brown, Newport, Giles county;

telegraph address, Christiansburg Depot. One stack, 35 x 9½, built in 1873; idle since 1882.

Van Buren Furnace, Van Buren Furnace P. O., Shenandoah county. Telegraph address, Woodstock. One stack, 37½ x 9, built in 1850 and rebuilt in 1870. George W. Chipman, assignee for Dudley C. Hall, owner, 110 Tremont st., Boston, Mass. Idle for several years and for sale.

Walton Furnace, Walton Furnace P. O., Wythe county. One stack, 33 x 8½, built in 1872. Machinery, which belonged to the Lobdell Car Wheel Company, removed in 1890. Stack and furnace property for sale. Jerome Blair, owner, Walton Furnace P. O.

Wythe Furnace, in Wythe county, 25 x 8, built in 1819 and rebuilt in 1873. Idle for many years.

WEST VIRGINIA.

BITUMINOUS COAL OR COKE.

Bettie Furnace, Black Band Iron and Coal Company, Spring Hill, Kanawha county. One stack, 50 x 10½, built in 1882-3; not in blast since 1886.

Quinnimont Furnace, Quinnimont Coal and Iron Company, Quinnimont, Fayette county. Office, 240 South Third st., Philadelphia. One stack, 60 x 16, built in 1874; idle since 1884.

KENTUCKY.

CHARCOAL.

Cumberland Gap Iron Company, Middlesborough, Bell county. Began building a stack in 1890, to be 60 x 14; work suspended in that year; nothing done since. O. W. Davis, Jr., President and Manager.

TENNESSEE.

COKE.

King Furnace, Rockdale Mining and Manufacturing Company, Rockdale, Maury county. One stack, 55 x 11, built in 1890 and blown in in that year, using charcoal as fuel; coke substituted for charcoal in 1891; likely to be long inactive.

CHARCOAL.

Butler Furnace, Doe Valley Association, 218 South Fourth st., Philadelphia. Furnace at Mountain City, Johnson county. One stack, 30 x 8, built in 1881 and first blown in in October, 1881; idle since 1885.

La Grange Furnace, Stribling, Stewart county, seven miles from Danville, on Memphis branch of the Louisville and Nashville Railroad. One stack, 65 x 12, built in 1832 and rebuilt in 1880 and 1884; likely to be long inactive. Owned by the La Grange Furnace Com-

pany; Herman Justi, agent for bondholders, Nashville, Tennessee. For sale.

Speedwell Furnace, Knoxville Car Wheel Company, Knoxville. Furnace at Stony Creek, Carter county. One stack, 41 x 9, built in 1880; idle for several years.

NORTH CAROLINA.

CHARCOAL.

Rehoboth Furnace, J. E. Reinhardt, Iron Station, Lincoln county. One stack, 38 x 9½, built in 1810; idle since 1883. For sale.

GEORGIA.

CHARCOAL.

Hermitage Furnace, Ridge Valley Iron Company, Hermitage, Floyd county. Located 8 miles north of Rome. One stack, 60 x 10, built in 1874; idle since 1884.

Tallapoosa Furnace, Tallapoosa, Haralson county. One stack, 60 x 11, built in 1888-9 and blown in in May, 1890; likely to be long inactive.

ALABAMA.

COKE.

Edwards Furnace, H. F. DeBardeleben, Birmingham. Furnace at Woodstock, Bibb county. One stack, 70 x 15, first blown in June 10, 1880; remodeled in 1887 and in 1890; idle for several years and likely to be long inactive.

Lady Ensley Furnace, Lady Ensley Furnace Company, Sheffield, Colbert county. One stack, 75 x 17, built in 1887-9 and first blown in April 25, 1889; likely to be long inactive. R. W. Cobb, Receiver.

CHARCOAL.

Coosa Furnace, Gadsden Iron Company, Gadsden, Etowah county. One stack, 64 x 12, built in 1882 with material from the Vigō Iron Company's No. 1 furnace at Terra Haute, Ind.; first blown in May 30, 1883; formerly called Gadsden Furnace; likely to be long inactive.

Decatur Charcoal Iron Furnace, The Decatur Land Company, New Decatur, Morgan county. One stack, 60 x 12, built in 1887-8 and blown in February 23, 1890; likely to be long inactive. For sale or lease.

Langdon Furnace, Langdon, (P. O. address, Rock Run Station,) Cherokee county. One stack, 42 x 11, built in 1873 and rebuilt in 1889-90; blown in in May, 1890; likely to be long inactive. For sale. Address Herman Rich, P. O. Box 659, Birmingham.

Piedmont Land and Improvement Company, Frank Nelson, Jr., Receiver, Anniston. One stack, to be 60 x 12, partly erected at Piedmont, Calhoun county, in 1890-91; work suspended in 1891; abandoned in 1898.

Tecumseh Furnace, Tecumseh Iron Company, Tecumseh, Cherokee county. One stack, 60 x 12, built in 1873 and blown in February 19, 1874; idle since October, 1890; likely to be long inactive; for lease. Woodstock Furnaces, Woodstock Iron Works, Anniston, Calhoun county. Two stacks, each 50 x 12; No. 1, blown in April 13, 1873; No. 2, first blown in August 27, 1879; abandoned and dismantled.

TEXAS.

CHARCOAL.

Llano (The) Improvement and Furnace Company, of Llano, Llano county, began the erection of a stack in 1892; excavations partly completed; work suspended; company in the hands of a receiver.

OHIO.

BITUMINOUS COAL OR COKE.

Baird Furnace, Baird Iron Company, Gore, Hocking county. Furnace in Perry county. Telegraph address, Baird Furnace. One stack, 54 x 12½, built in 1874-5 and blown in October 9, 1875; rebuilt in 1886; fuel, raw semi-bituminous coal; idle since 1888 and likely to be long inactive.

Grace Furnace, The Brier Hill Iron and Coal Company, Youngstown, Mahoning county. One stack, No. 1, 80 x 18, built in 1861, torn down in 1873, and rebuilt in 1882; fuel, coke; abandoned in 1897.

Huron Furnace, T. S. Matthews, Trustee for Portsmouth National Bank of Portsmouth and First National Bank of Jackson. Furnace at Jackson, Jackson county. One stack, 49 x 13, first blown in April 19, 1875, and rebuilt in 1889; idle for several years and likely to be long inactive.

Ironton Furnace, Ironton, Lawrence county. One stack, 58 x 16, built in 1873-4; fuel, raw coal and West Virginia coke; likely to be long inactive.

Moxahala Furnace, The King, Gilbert, and Warner Company, Columbus. Furnace at Moxahala, Perry county. One stack, 70 x 16½, built in 1877-8 and rebuilt in 1887; fuel, Connellsville and New River coke; abandoned and dismantled in 1897.

New York and Western Coal Company, Room 50, Wesley Block, Columbus. New York office, 44 Broadway. Four stacks: Helen Furnace, at Orbiston, Hocking county, one stack, 52 x 15, built in 1877 and first blown in in December, 1877; likely to be long inactive. XX Furnace, at Shawnee, Perry county, one stack, 50 x 14, built in 1876-7 and first blown in January 18, 1877; likely to be long inactive; for sale. A and B Furnaces, at Floodwood, Athens county, two stacks, each 75 x 17, completed in 1888; dismantled in 1897. Fuel, mainly raw coal mixed with some coke.

CHARCOAL.

Buckeye Furnace, Superior Coal Company, Jackson. Furnace at Riverton, Jackson county. One stack, 40 x 10, built in 1851; partly dismantled.

Hecla Furnace, Ironton, Lawrence county. One stone stack, built in 1833; replaced by an iron stack in 1887-90.

Jefferson Furnace, Jefferson Furnace Company, Oak Hill, Jackson county. One stack, 40 x 11½, built in 1854; likely to be long inactive.

Pine Grove Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. One stack, 34 x 11, built in 1827 and rebuilt in 1844; likely to be long inactive.

Scioto Furnace, Crawford & Leonard, Scioto Furnace, Scioto county. One stack, 32 x 10¾, built in 1826 and rebuilt in 1844; idle for several years and likely to be long inactive.

INDIANA.

BITUMINOUS BLOCK COAL AND COKE.

Brazil Furnace, The Central Iron and Steel Company, Brazil, Clay county. One stack, 60 x 13, built in 1867, blown in in December, 1867, and remodeled in 1872; fuel, raw block coal and coke; abandoned and to be dismantled.

Vigo Furnace, Vigo Iron Company, Terre Haute, Vigo county. One stack, 62½ x 13, built in 1872 and blown in in 1873; rebuilt in 1889; fuel, raw coal; abandoned and to be dismantled.

ILLINOIS.

COKE.

Big Muddy Furnace, Grand Tower, Jackson county. Owners, Solon Humphreys and Amos Cotting, New York, and John W. Harrison, St. Louis. One stack, 69 x 17, built in 1871; likely to be long inactive.

MICHIGAN.

MIXED ANTHRACITE AND BITUMINOUS COAL.

Grace Furnace, Travers Iron Company, Chicago. Furnace at Marquette. One stack, 63 x 17, built in 1872; fuel, when last in blast, mixed anthracite and bituminous coal; idle for many years.

CHARCOAL.

Antrim Iron Company, Mancelona, Antrim county. General office, Grand Rapids. One stack, 48 x 10, put in blast December 25, 1882, burned May 29, 1883, and rebuilt the same year; abandoned in 1892 and dismantled in 1895.

Carp Furnace, Carp River Furnace Company, Detroit. Furnace at Marquette, Marquette county. One stack, 47 x 10, built in 1872-3, burned in 1882, and rebuilt in 1889-90; idle for several years and likely to be long inactive.

Deer Lake Furnaces, Deer Lake Company, Ishpeming, Marquette county. Two alternate stacks: one, 49 x 8, built in 1868; the other, 47 x 9, built and put in blast in 1873; partly dismantled.

Eureka Furnaces, Eureka Iron and Steel Works, Detroit. Furnaces at Wyandotte, Wayne county. Two stacks: one stack, 45 x 9, built in 1863, formerly known as Ward Furnace, abandoned; the other stack, 55 x 11, built in 1855, rebuilt in 1884-5, and remodeled since; likely to be long inactive.

Gogebic Furnace, Iron River, Iron county. One stack, 56 x 11, built in 1885. Owner, E. D. Reis, New Castle, Pa. Idle since 1888.

WISCONSIN.

CHARCOAL.

Fond du Lac Furnace, Fond du Lac Iron Company, Fond du Lac, Fond du Lac county. One stack, 52 x 10½, built in 1873-4 and first put in blast in 1883; burned in 1895; for sale.

Sauk Furnace, Iron Mountain Ore and Furnace Company, Ironton, Sauk county. Telegraph address, La Valle. One stack, 30 x 8½, built in 1857; likely to be long inactive.

MISSOURI.

COKE.

Jupiter Furnace, James Green, St. Louis, St. Louis county. One stack, 75 x 20, finished in 1873, blown in for the first time in 1880, and remodeled in 1887; likely to be long inactive.

UTAH.

CHARCOAL.

Grace Furnace, Ogden Furnace and Manufacturing Company, Ogden. Furnace at Steelton, Weber county. Commenced building in 1896 one stack, 55 x 10½; work suspended; enterprise abandoned.

WASHINGTON.

CHARCOAL.

Irondale Furnace, Puget Sound Iron Company, Irondale, Jefferson county. Main office, 530 California st., San Francisco, Cal. One stack, 50 x 10, built in 1880-1 and blown in January 27, 1881; rebuilt in 1882-3 and remodeled in 1884; idle for several years and likely to be long inactive.

ROLLING MILLS AND STEEL WORKS.

The rolling mills and steel works described in the following list are either in operation or are standing idle with machinery in good condition. The telegraph address is given only when it is not the same as the post-office address. When the power is not mentioned steam-power is understood. Unless otherwise stated the annual capacity given is on double turn. A list of rolling mills and steel works which have been recently abandoned will be found separately printed beginning on page 195.

MAINE.

Portland Rolling Mill, P. O. Box 1,386, Portland, Cumberland county. Built in 1866; 4 double puddling furnaces, one Siemens and 4 coal heating furnaces, and 3 trains of rolls (one 10-inch guide, one 18-inch bar, and one 18-inch muck); product, merchant bar iron, railroad spikes, angle and plain fish-plates, and angle and bridge iron; annual capacity, 15,000 gross tons. Fuel, bituminous coal and producer gas. Brands, "Standard," "Extra," "Refined," "Special," and "Forest City." C. R. Milliken, President; John W. Leavitt, Secretary and Treasurer; Samuel Peters, Superintendent.
Number of rolling mills in Maine: 1.

NEW HAMPSHIRE.

Nashua Iron and Steel Company, Nashua, Hillsborough county. Built in 1848; steel-tire mill added in 1867; 20 heating furnaces, one 10-gross-ton basic open-hearth steel furnace, 3 trains of rolls, (two 100 x 28-inch plate and one 12-inch bar,) and 11 hammers; machine shop built in 1863 and rebuilt and enlarged in 1872 for manufacturing rolling-mill and steam machinery; product, steel and iron forgings for railroads and machine shops, homogeneous steel and iron plates, steel plates, steel locomotive and car-wheel tires, bar steel, and bar iron; annual capacity, single turn, 10,500 gross tons of rolled products and 6,000 tons of forged products; of open-hearth ingots, 3,500 tons. Fuel, coal. Brand, "Indian Head." Henry E. Burnham, President; Frank P. Carpenter, Treasurer.
Number of rolling mills and open-hearth steel works in New Hampshire: 1.

MASSACHUSETTS.

- Bridgewater Iron Company, Bridgewater, Plymouth county. Built in 1785 and 1874; 5 scrap furnaces, 10 heating furnaces, 1 air and 2 cupola furnaces, and 7 trains of rolls; steam and water power; product, bar iron, tack plate, yellow metal sheathing, and all kinds of castings; annual production of rolled iron, about 5,500 gross tons. Fuel, coal. John E. Sanford, Luke P. Willard, and Arthur E. Denison, Trustees. John M. Stetson, General Manager.
- Danvers Iron Works, Sylvester & Co., 8 Oliver st., Boston. Works at Danversport, Essex county. Built in 1831; burned and rebuilt in 1883; again burned in 1894 and rebuilt in 1895; 3 heating furnaces and 2 trains of rolls (one 8 and one 12-inch); product, merchant bar iron, bolt iron, scrap rods, and railroad and ship spikes; annual capacity, 4,500 gross tons. Fuel, coal. Brand, "Danvers."
- Franconia Iron and Steel Works, George F. Blake, Jr., lessee, Wareham, Plymouth county. Built in 1866; 6 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 8, one 16, and one 18-inch); product, bar iron of all kinds and sizes; specialties, round, square, and flat iron, angles, ovals, half ovals, half rounds, axle and axe iron, and shafting; daily capacity, 54 gross tons. Fuel, coal. J. H. Warr, Manager. Owned by the Estate of James C. Warr.
- Kinsley Iron and Machine Works, Kinsley Iron and Machine Company, Canton, Norfolk county. Established in 1787 by Leonard & Kinsley, who manufactured steel by the German process; stock company formed in 1855; 3 double puddling and 5 heating furnaces, 2 busheling and 2 scrap furnaces, 9 hammers, and 3 trains of rolls (one 8, one 14, and one 19-inch); steam and water power; product, merchant bar iron, shapes, splice bars, track bolts, building rods, bolts, hangers, wagon axles, and steam and street railroad supplies; annual capacity, 11,000 gross tons. Fuel, coal and oil. Brands of bar iron, "Kinsley" and "G. K." A forge is connected with the works for the production of wagon axles, etc.; also a foundry and a machine shop. Frank M. Ames, Treasurer. Sales made by the company.
- Mannesmann Cycle Tube Works, No. 1 Broadway, New York. Works at Zylonite, Adams, Berkshire county. Built in 1896 and put in operation in 1897; 2 heating furnaces and 6 trains of rolls; water-power; product, brass and copper tubes and seamless steel bicycle tubing; annual capacity, 1,500,000 pounds of copper tubes, 3,000,000 pounds of brass tubes, and 12,000,000 feet of steel bicycle tubes. Fuel, petroleum.
- Mount Hope Iron Works, Mount Hope Iron Company, Somerset, Bristol county. Built in 1875; one single and 6 double puddling furnaces, 12 heating furnaces, 100 cut-nail machines, and two 18-inch trains of rolls; product, nails, skelp iron, tack and shovel plate, etc.;

annual capacity, single turn, 8,000 gross tons of rolled products and 140,000 kegs of cut nails. Fuel, bituminous coal. Brand, "Mount Hope Iron Works." Job M. Leonard, Treasurer; Henry B. Leonard, Agent. Selling agents, F. M. Trafton, 141 Milk st., Boston; Carl Seelig, 134 South Water st., Providence, Rhode Island.

Robinson Iron Company, Plymouth, Plymouth county. Built about 1800; 6 heating furnaces, 2 trains of rolls, and 18 cut-nail machines; steam and water power; product, nails and tack plate; average yearly production, 2,700 gross tons of rolled products and 26,000 kegs of cut nails. Fuel, coal. Increase Robinson, President; James Millar, Treasurer.

Thomson-Houston Electric Company, Steel Foundry Department, 42 Centre st., Lynn. (Operating for the General Electric Company; general office, Schenectady, New York.) W. C. Fish, Manager Lynn Works. Two 15-gross-ton open-hearth acid steel furnaces, erected in 1892 and first steel made March 4, 1893; product, steel castings; annual capacity, 5,000 gross tons. Fuel, manufactured gas. C. A. Coffin, President; Eugene Griffin, J. P. Ord, and E. W. Rice, Jr., Vice-Presidents; M. F. Westover, Secretary; Henry W. Darling, Treasurer.

Tremont Nail Works, Tremont Nail Company, West Wareham, Plymouth county. Built about 1820 and rebuilt in 1846; Clapp-Griffiths steel plant, added in 1887, has one 3-gross-ton converter and first made steel in December, 1887; one 20-gross-ton basic open-hearth steel furnace, with producers, erected in 1893 and first steel made June 8, 1893; 3 blooming furnaces, 4 heating furnaces, and 4 trains of rolls, (one 24-inch blooming, one 24-inch finishing, one 18-inch nail plate, and one 17-inch tack,) and 150 cut-nail machines; steam and water power; annual capacity, 30,000 gross tons of steel ingots, with mill facilities for finishing them, and 200,000 kegs of cut nails. Fuel, coal and manufactured gas. Brands, "Percha plates" and "Percha nails." Horace P. Tobey, Treasurer. Goods sold at the factory and at the company's store at 76 Pearl st., Boston.

United States Navy Yard, Charlestown, Suffolk county. Mill built in 1868; 19 forge fires, 11 chain fires, 6 heating furnaces, and 2 trains of rolls (one 10 and one 18-inch); product, bar iron for chain cables, etc., for government use; annual capacity, single turn, 245 gross tons. Fuel, bituminous coal.

Washburn and Moen Manufacturing Company, Worcester, Worcester county. Quinsigamond, or South Works: rolling mill built in 1846; 12 heating furnaces and 10 trains of rolls (nine rod and one billet); product, billets and iron and steel wire rods and wire; annual capacity, 115,000 gross tons of rods. Open-hearth steel department contains one 12 and two 20-gross-ton acid furnaces and one 20-gross-ton basic furnace; first open-hearth steel made September 26, 1885; annual capacity, 52,000 gross tons of ingots. Fuel, coal. (Grove

Mill, or North Works, built in 1863, now produces wire only, rod train having been removed to the Quinsigamond Works.) The company also manufactures springs of all kinds, and operates galvanizing, barbed-wire, wire-rope, wire-nail, and insulated wire and cable plants; also a plant for refining copper. Wm. E. Rice, President; Philip W. Moen, Vice-President, Treasurer, and General Manager; F. H. Daniels, General Superintendent. Selling agents, R. K. Dana, 16 Cliff st., New York; C. S. Knight, Pittsburgh; C. T. Boynton, 160-64 Lake st., Chicago; George A. Cragin, Houston, Texas; F. L. Brown, 10 Pine st., San Francisco, California. *See Rolling Mills in Illinois, (Waukegan Works.)*

Worcester Cycle Manufacturing Company, Worcester, Worcester county. Principal office, 51 Broad st., New York. Built in 1857 and remodeled in 1882; one 4 and one 10-gross-ton acid open-hearth steel furnace, the latter erected in 1893; first open-hearth steel made March 25, 1885; merchant mill added in 1888; one 20-inch train of rolls; product, steel castings. Fuel, manufactured gas. Idle and for sale or lease. (Formerly called New England Steel Works.) The company also operates an iron foundry and manufactures bicycles. C. Weidenfeld, President; J. V. Riedel, Treasurer; M. J. P. McCafferty, Agent.

Number of rolling mills and steel works in Massachusetts: 12. Of these 1 has a Clapp-Griffiths steel plant and 4 have open-hearth steel plants.

RHODE ISLAND.

Rhode Island Horse Shoe Works, Rhode Island Perkins Horse Shoe Company, Providence. Works at Valley Falls, 6 miles from Providence. Built in 1867 and rebuilt in 1874; burned January 7, 1887, and rebuilt and running in full June 1, 1887; 7 scrap and 7 heating furnaces, 10 trains of rolls, (seven 8 and three 18-inch,) and 28 horse-shoe machines; product, bars for the horseshoe machines and toe-calks; annual capacity, single turn, 18,000 gross tons. Fuel, bituminous coal. Brands, "Perkins' United States Standard Horse and Mule Shoes," "Perkins' XL Steel Shoes," "Perkins' New Toe-weight Shoe," "Perkins' New Side-weight Shoe," "Perkins' Cow-boy Shoe," etc., and "Perkins' Patent Toe-Calks." F. W. Carpenter, President; C. H. Perkins, General Manager; R. W. Comstock, Secretary; Charles R. Stark, Treasurer.

Number of rolling mills in Rhode Island: 1.

CONNECTICUT.

Aetna Nut Company, Southington, Hartford county. Built in 1872-3; 1 single puddling furnace, 1 scrap and 3 busheling furnaces, 3 heating furnaces, and 3 trains of rolls (one muck and one 8 and one 10-

inch finishing); product, merchant iron, machine-forged and hot-pressed nuts, washers, wrought butts, and hinges; annual capacity, single turn, 4,500 gross tons. Fuel, coal. H. H. Clark, President; Benjamin S. Porter, Secretary and Treasurer; S. D. Neal, General Manager.

Collins Company, Collinsville, Hartford county. Established in 1826; 2 scrap and 8 heating furnaces, one 12-inch and one 18-inch train of rolls, 2 hammers, two 20-ton steel cementing furnaces, four 2-pot crucible steel-melting holes, and one 24-pot Siemens gas steel-melting furnace; steam and water power; product, bar iron and cast steel, consumed wholly in these works in the production of "Collins" edge tools, steel plows, etc.; annual capacity of finished iron, single turn, 2,250 gross tons; of steel ingots, 600 tons. Fuel, manufactured gas. Edward H. Sears, President; Meigs H. Whaples, Secretary and Treasurer; William Hill, Agent. Treasurer's and transfer office, Hartford.

Farist (The) Steel Company, Bridgeport, Fairfield county. Built in 1868; enlarged since; 2 single puddling and 4 heating furnaces, 2 trains of rolls, (12 and 16-inch,) 6 hammers, and one 24-pot Siemens gas crucible steel-melting furnace; product, crucible steel, rolled and hammered; also rerolls and hammers open-hearth and Bessemer steel; annual capacity, 1,200 gross tons of crucible ingots, 3,200 tons of rolled products, and 300 tons of forged products. Fuel, manufactured gas and coal. Added in 1883 a spring shop for the manufacture of spiral springs and elliptic railroad springs. Brand, "The Farist Steel Co." Joel Farist, President; George Windsor, Secretary and Treasurer. Selling agents, John S. Brewer, Chicago, Illinois; J. H. Wyeth, St. Louis, Missouri.

Malleable Iron Fittings Company, Branford, New Haven county. One 20-gross-ton acid open-hearth steel furnace, erected in 1896; first steel made in 1896; product, steel castings for machinery, bicycle, and gun work; annual capacity, 3,000 gross tons. Fuel, manufactured gas. A. C. Walworth, President; A. E. Hammer, Secretary; T. F. Hammer, Treasurer and Manager.

New Haven Rolling Mill, New Haven Rolling Mill Company, New Haven, New Haven county. Completed in August, 1871; 4 charcoal forge fires, 9 heating furnaces, 4 trains of rolls, (one 8, one 10, one 16, and one 18-inch,) and one hammer; uses scrap iron and rerolls steel billets; product, bars, small nut and bolt rods, and refined and charcoal wire rods; annual capacity, 20,000 gross tons. Fuel, coal. Brand, "N. H." Pierce N. Welch, President and Treasurer; E. S. Wheeler, Secretary; Frank E. Williams, Assistant Treasurer, Manager, and Agent; Charles O. Jolly, Superintendent.

Pope (The) Tube Company, Hartford, Hartford county. Tube works built in 1896; rolling mill added in 1897; one heating furnace and

one train of rolls; product, blanks consumed by the company in the manufacture of seamless drawn tubes; annual capacity, 5,000 gross tons of blanks and 10,000,000 feet of seamless drawn steel tubes. Fuel, coal. Brand, "Pioneer." Albert A. Pope, President; George H. Day, Vice-President; Harold H. Eames, Secretary and Manager.

Thames (The) Iron Works, Norwich, New London county. Built in 1863; 4 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (10 and 18-inch); product, merchant bar iron and spike rods; annual capacity, single turn, 4,000 gross tons. Fuel, coal. John Mitchell, President; Albert G. Mitchell, Secretary and Treasurer; Charles Mitchell, Superintendent.

Wilmot and Hobbs (The) Manufacturing Company, Bridgeport, Fairfield county. Hot Rolling Mill Department built in 1887; product, hoop, band, and plate and sheet steel; annual capacity, 30,000 gross tons. Fuel, manufactured gas. Brand, "Swedoh." Also operates a cold-rolling department with an annual capacity of 15,000 gross tons. F. A. Wilmot, President and Treasurer; S. M. Wilmot, Vice-President; P. L. Bryning, Secretary; Albert N. Stanton, 2d Vice-President; Calhoun Latham, Assistant Treasurer; C. D. S. Miller, Superintendent of Manufacture. Selling agent, George Damerel, 253 Broadway, New York City.

Windsor Locks Steel Works, Farist & Windsor, Bridgeport. Works at Windsor Locks, Hartford county. Built in 1860; 2 Stubblebine heating furnaces, 3 trains of rolls, (one 10, one 12, and one 18-inch,) and ten 4-pot crucible steel-melting holes; steam and water power; product, merchant steel, tack plate, and tool and die steel; annual capacity, single turn, 5,500 gross tons. (Formerly operated by The Windsor Locks Steel Company.) Idle and for sale.

Number of rolling mills and steel works in Connecticut: 9. Of these 1 makes open-hearth steel, 3 make crucible steel, and 1 makes blister steel.

NEW YORK.

Auburn Iron Works, C. W. Tuttle & Co., Auburn, Cayuga county. Built in 1853; 2 heating furnaces, one 10-inch train of rolls, and 1 hammer; use scrap iron only; product, merchant bar and horse-shoe iron; annual capacity, 4,000 gross tons. Fuel, coal. Brand, "Auburn."

Buffalo Steel Foundry, Pratt and Letchworth Company, Buffalo, Erie county. One 7-gross ton and one 9-gross-ton acid open-hearth steel furnace; product, steel castings. Fuel, producer gas. O. P. Letchworth, President; Josiah Letchworth, Secretary and Treasurer; J. C. Bradley, Superintendent.

Burden Iron Works, The Burden Iron Company, Troy, Rensselaer county. Founded in 1813; 35 double and 10 single puddling furna-

ces, 12 heating furnaces, and 11 trains of rolls (six 9-inch, one 14-inch, and four 20-inch); product, bar and other merchant iron, horse-shoes, and boiler rivets; annual capacity, 45,000 gross tons. Fuel, bituminous coal. Brands of merchant iron, "H. B. & S." and "Burden Best." James A. Burden, President; John L. Arts, General Manager; Nicholas J. Gable, Secretary. *See Furnaces in New York.*

Chrome Steel Works, Brooklyn, Kings county. Office and works, Kent ave. and Keap and Hooper sts. New York office, 11 Pine st. Built in 1869; 7 heating furnaces, 7 hammers, nine 6-pot crucible steel-melting holes, and 3 trains of rolls (one 12, one 18, and one 24-inch); 54 pots can be used at each heat in the steel works; product, tool steel and burglar-proof welded chrome steel and iron, 5-ply, for safes, jails, etc.; also adamantine shoes and dies for crusher stamp mills and crucible chrome steel castings; annual capacity, 3,500 gross tons. Fuel, manufactured gas. Brand, "Chrome." C. P. Haughian, President; F. E. Canda, Vice-President; C. J. Canda, Secretary; J. G. Dunscomb, Treasurer.

Cohoes Rolling Mill, Morrison, Colwell & Page, 253 River st., Troy. Works at Cohoes, Albany county. Built in 1864; burned and rebuilt in 1883; 8 double puddling furnaces, 2 scrap and 3 Swindell gas heating furnaces, and 3 trains of rolls; water-power; product, band and bar iron; specialty, high-grade iron for edge tools, butts, hinges, and boiler flues; annual capacity, 7,000 gross tons. Fuel, bituminous coal and producer gas. Brands, "Cohoes Refined" for regular, "Hatchet" for extra refined, and "Adze" for best.

Elmira Rolling Mills, Elmira Iron and Steel Rolling Mill Company, Elmira, Chemung county. Mill originally built as a rail mill in 1860; puddle mill built in 1868; rail mill converted into puddle mill in 1883; 17 single puddling furnaces, one hammer, and two 18-inch trains of rolls. Bar mill erected in 1864; 4 heating furnaces and 4 trains of rolls, (one 9, one 12, and one 18-inch, and one 22-inch for 6 x 4-inch and 6 x 6-inch angles.) Universal mill, built in 1884 to roll plates from 6 to 30 inches wide and of any thickness, has 2 Siemens heating furnaces, 9 x 12 feet, with a daily capacity of 18 gross tons. Annual capacity, 18,000 gross tons of bar, angle, plate, and band iron. Two 20-gross-ton basic open-hearth steel furnaces added in 1896; annual capacity, 40,000 gross tons of ingots. Fuel, manufactured gas and coal. N. D. Doxey, President and General Manager; Jesse L. Cooley, Secretary and Treasurer. Idle and for sale.

Johnson (Isaac G.) & Co., Spuyten Duyvil, New York City. Crucible steel plant erected in 1880; four 5-pot crucible steel-melting holes; annual capacity, 180 gross tons of crucible steel castings. Open-hearth steel plant erected in 1882; two 8-gross-ton acid open-hearth steel furnaces; annual capacity, single turn, 3,600 gross tons of open-hearth steel castings. Fuel, coal.

Manhattan Rolling Mill, John Leonard, lessee, 362 Avenue A., New York City. Built in 1892 and first put in operation September 1, 1892; one double puddling furnace, 2 heating furnaces, and 2 trains of rolls (one 10 and one 18-inch); product, horseshoe iron and horseshoes; annual capacity, 2,500 gross tons of horseshoe iron and horseshoes. Fuel, bituminous coal. Brand for horseshoe iron, a horseshoe inclosing the letters "J. L." (Formerly called the New York City Rolling Mill.) Owned by John F. Hanley.

Monhagen Steel Works, Wheeler, Madden, and Clemson Manufacturing Company, Middletown, Orange county. Operated by the National Saw Company; general office, Newark, New Jersey. Built in 1862-3; 48 two-pot crucible steel-melting holes, 4 heating furnaces, one train of rolls, and one hammer; product, saw steel; annual capacity, 2,500 gross tons. Fuel, anthracite coal. E. B. Radcliff, President; J. Franklin Fort, Vice-President; Frederick B. Earle, Secretary and Treasurer.

Newburgh (The) Wire and Nail Company, Newburgh, Orange county. Built in 1890; 2 gas heating furnaces, 4 trains of rolls, (9, 10, 12, and 16-inch,) and 25 wire-nail machines; product, wire rods; annual capacity, 27,000 gross tons. B. B. Odell, Jr., President; Frank Merrihew, Vice-President; H. B. Odell, Treasurer; Joseph A. Sneed, Superintendent. (Formerly operated by the Kilmer Manufacturing Company. The trains of rolls are idle; the wire-nail and other departments of the works are operated under lease by the Palatine Wire Company, of 253 Broadway, New York City, which manufactures barbed wire, wire nails, staples, and bale ties.)

Onondaga Steel Works, Sweet's Steel Company, Syracuse, Onondaga county. Built in 1863 and enlarged several times; 9 heating furnaces, 3 hammers, (from 200 to 2,000 pounds each,) 3 trains of rolls, (one 9 and two 12-inch,) and 3 steel cementing furnaces; use Sweet's patent gas furnaces, burning semi-bituminous coal; manipulate old Bessemer steel rails and locomotive tires, and convert iron into blister steel; product, bar steel, steel crow-bars, tire and spring steel, and steel for various other purposes; annual capacity, 11,000 gross tons. Special products, "Sweet's Excelsior" tire steel, "Sweet's" steel crow-bars, "Sweet's" toe-calks, and "Favorite" toe-calk steel. (Formerly operated by Sweet's Manufacturing Company.) William A. Sweet, President; C. H. Knapp, Secretary; Ethel Sweet, Treasurer; Peter Eckel, Superintendent.

Osborne (D. M.) & Co., Auburn, Cayuga county. Built in 1881; 4 heating furnaces, 2 trains of rolls, (one 8 and one 10-inch,) and one hammer; use scrap iron and steel billets; product, merchant bar of all sizes and shapes, part of which is used by the firm in the manufacture of agricultural machinery; annual capacity, single turn, 5,000 gross tons of rolled products and 2,500 tons of forged products.

Fuel, bituminous coal. T. M. Osborne, President; J. H. Osborne, Secretary; Edwin D. Metcalf, Treasurer and General Manager; C. F. Baldwin, Assistant Treasurer. Branch offices in the United States: Philadelphia, Columbus, Chicago, St. Louis, and San Francisco; in foreign countries: London, England; Paris, France; Bremen, Germany; Odessa, Russia; and Sydney, Australia.

Phoenix Horse Shoe Company, Poughkeepsie, Dutchess county. Built in 1873; one single puddling furnace, 2 gas and 22 coal heating furnaces, and 5 trains of rolls; specialty, horseshoes; annual capacity, 13,000 gross tons. Fuel, coal and manufactured gas. Brand, "Phoenix." Charles W. Miller, President; James D. Keith, Manager. *See Rolling Mills in Illinois.*

Rome Merchant Iron Mill, Rome, Oneida county. Built in 1869; 8 double puddling furnaces, 5 heating furnaces, and 3 trains of rolls (8, 12, and 18-inch); product, best high grades of merchant puddled bar, stay-bolt, plow-bolt, horseshoe, snow-ball horseshoe, hexagon and beveled-edge tire, and screw, hoop, and band iron; high-grade refined iron branded "Rome," and a superior quality branded "J. G.;" annual capacity, single turn, 12,000 gross tons. Fuel, coal. Jim Stevens, President; S. B. Stevens, Vice-President; Charles W. Lee, Secretary and Treasurer.

Sanderson Brothers Steel Company, Syracuse, Onondaga county. Branch houses, 11-13 South Jefferson st., Chicago, and 99 Water st., Cleveland. Established in 1876; 14 heating furnaces, 4 annealing furnaces, 10 hammers, 4 trains of rolls, (one 16-inch sheet, and one 9, one 10, and one 12-inch,) and two 30-pot and four 12-pot Siemens crucible steel-melting furnaces; product, hammered and rolled crucible steel of every description, shear steel, and sheet steel; specialty, the finest quality of tool steel; annual capacity, 7,000 gross tons. Fuel, coal. Brand, "Sanderson Bros. & Co." (Two steel cementing furnaces for the production of blister steel abandoned.) C. H. Halcomb, President and Treasurer; G. D. Green, Secretary.

Somerton Tin Plate Works, Somers Brothers, Third st. and Third ave., Brooklyn, Kings county. Built in 1891 as an addition to a tin-box establishment and first put in operation in October, 1892; 6 heating furnaces, 3 annealing furnaces, and six 20 x 26-inch hot and three 18 x 24-inch cold mills; product, iron or steel black sheets for tin-plates, from No. 26 to No. 36 gauge; annual capacity, 4,500 gross tons. Fuel, coal. Brands, "Somerton" and "Somerbrook." *See Tin-plate Works in New York.*

Standard Rolling Mill, M. J. Dempsey, Fortieth st. and Eleventh ave., New York City. Built in 1891; 3 coal heating furnaces and 2 trains of rolls (10 and 18-inch); product, merchant bar, angles, and horseshoe iron; annual capacity, 6,000 gross tons. Fuel, manufactured gas. Brand, "Standard." William S. Dempsey, Superintendent.

Syracuse Works, The American Steel Casting Company, Thurlow, Pa. Works at Geddes, Onondaga county. Built in 1886; open-hearth steel plant added in 1890 and enlarged in 1891; first castings made in November, 1890; burned in 1892 and rebuilt and enlarged in the same year; two 10-ton Siemens acid furnaces; product, open-hearth steel castings; annual capacity, 3,000 gross tons. Fuel, coal. (Formerly operated by the Syracuse Steel Foundry Company.) *For list of branch offices and full list of officers see Thurlow Works, Pennsylvania. See Thurlow and Norristown Works in Eastern Pennsylvania, Pittsburgh Works in Allegheny County, Sharon Works in Western Pennsylvania, and Alliance Works in Ohio (Interior Counties District.)*

Troy (The) Steel Company, Troy, Rensselaer county. General office, Troy; New York office, 40 Wall street. Formerly the Troy Steel and Iron Company. Three works. Albany Iron Works, established in 1819; 23 heating furnaces, 7 trains of rolls, 4 steam and 2 trip hammers, and 2 bolt, 8 rivet, and 2 nut machines; steam and water power; product, bars, car axles, bands, hoops, finger-bars, crow-bars, fish-plates, bolts and nuts, boiler rivets, and steel forgings; annual capacity, 50,000 gross tons. Rensselaer Iron Works, established in 1846; merchant mill built in 1866 and 1867; new merchant mill built in 1877 and 1878; 18 heating furnaces and 4 trains of rolls; product, steel shapes and sheets and merchant steel of all kinds; annual capacity, 25,000 gross tons. Brands of steel, "XX Gun," "XX Special Dead Soft," "XX Gun Barrel," and a variety of other special grades. Bessemer Steel Works, built at Troy in 1864 and removed to Breaker Island (opposite Troy) and enlarged in 1896; first blow made at Troy on February 15, 1865; first blow made at Breaker Island on September 11, 1896; three 15-gross-ton basic converters, 4 cupolas, 4 spiegel cupolas, two 5-hole Hainsworth pit furnaces, and 24 soaking pits; annual capacity, 200,000 gross tons of ingots. Rolling mill connected with the steel works contains one 35-inch 2-high reversing blooming mill, with 42 x 60-inch reversing engines, and one 3-high 21-inch billet mill; product, billets, blooms, slabs, and skelp; annual capacity of rolled material, 200,000 gross tons. Fuel in all the works, bituminous coal. Frank S. Witherbee, President; George A. Bell, Vice-President and General Manager; Frank W. Edmunds, Secretary and General Sales Agent; E. D. Arnold, Chief Engineer and General Superintendent. *See Furnaces in New York.*

Westerman Rolling Mill, Westerman & Co., Lockport, Niagara county. Built in 1870; 4 heating furnaces and 2 trains of rolls; steam and water power; product, horseshoe iron, rounds, squares, hexagons, and fancy shapes of all kinds; annual capacity, 6,000 gross tons. Fuel, coal. Brand for horseshoe iron, "W" inside of a horseshoe.

Wurster (F. W.) & Co., 375-93 Kent ave., Brooklyn, Kings county. Built in 1890 and put in operation in 1891; 2 heating furnaces and

2 trains of rolls (one 10 and one 18-inch); product, merchant bar iron; annual capacity, single turn, 4,000 gross tons. Fuel, bituminous coal. Brand, "F. W. W. & Co." F. W. Wurster, Manager.

Number of rolling mills and steel works in New York: 23. Of these 1 makes Bessemer steel, 4 make open-hearth steel, 4 make crucible steel, and 1 makes blister steel.

NEW JERSEY.

American Horse Shoe Company, Phillipsburg, Warren county. Built in 1865; 6 heating furnaces and 3 trains of rolls (two 9-inch guide and one 18-inch bar); product, a superior grade of horseshoe bars; specialty, horseshoes; annual capacity, 5,000 gross tons. Fuel, coal. Brand, "American." (Formerly called the Delaware Rolling Mill.) Charles H. Holton, President; Philip S. Dyer, Secretary and Treasurer.

American Sheet Iron Works, American Sheet Iron Company, Phillipsburg, Warren county. Built in 1867; enlarged in 1870, 1873, 1882, and 1892; 2 double puddling furnaces, 1 heating furnace, 3 sheet-finishing furnaces, 1 pair furnace, 3 annealing furnaces, one 22-inch muck mill, one 22-inch bar mill, two 22-inch sheet mills, and one 22-inch black-plate mill, all hot, two 22-inch cold mills, 1 rotary squeezer, and 1 hammer; product, best qualities of sheet iron and sheet steel for stamping and enameling and black plates for tinning; annual capacity, triple turn, 2,400 gross tons of sheets and 1,400 tons of black plates. Fuel, anthracite and bituminous coal. Brand, for sheets only, "American R. G. cleaned." Joseph C. Kent, President; George Danby, Secretary and Treasurer; William Boofman, Superintendent.

Benjamin (The) Atha and Illingworth Company, Harrison, Hudson county. (This company was formed June 1, 1891, by the consolidation of Benjamin Atha & Co. and John Illingworth & Co.) Two works: Newark Steel Works, at Newark, Essex county, began operations in 1864; two 30-pot Siemens crucible steel-melting furnaces; annual capacity, 4,500 gross tons; one 7-gross-ton and one 12-ton Siemens acid open-hearth steel furnace with complete foundry equipment for open-hearth steel castings; annual capacity, 15,000 gross tons; 7 heating furnaces, 3 steam hammers, and 3 trains of rolls, (two 8 and one 16-inch.) Harrison Works, (formerly called New Jersey Steel Works,) at Harrison, Hudson county, (opposite Newark,) built in 1888-9 and put in operation in April, 1889; one 30-pot crucible steel-melting furnace; annual capacity, 2,250 gross tons of ingots; 24 heating furnaces, 6 trains of rolls, (one 8, two 9, one 10, one 12, and one 16-inch,) and 14 steam hammers. Product, tool, die, spring, and cutlery steel, all grades of merchant bar, wire rods in coils, forgings,

and steel castings; total annual capacity of rolled products, 30,000 gross tons; of forged products, 6,000 tons. Fuel, coal and petroleum. Brands, "Champion," "Champion Extra," and "Champion Special." (The Jersey City Steel Works, at Jersey City, formerly operated by Benjamin Atha & Co., have been abandoned.) Benjamin Atha, President; John Illingworth, Vice-President and Manager; Abram C. Denman, Secretary; Henry G. Atha, Treasurer; Robert H. Illingworth, Superintendent. Branch warehouses: 93 John st., New York; 1009 Arch st., Philadelphia; 247 Lake st., Chicago. Selling agents, Priest, Page & Co., Boston.

Boonton Iron Works, Boonton Iron and Steel Company, lessee, Boonton, Morris county. Built originally in 1825 and enlarged since; 9 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls; steam and water power; product, bar iron and angles; annual capacity, 11,000 gross tons. Fuel, bituminous coal. Brand, "Boonton." (Cut nail department dismantled.) John Barker, President; Charles Brock, Treasurer. Owned by the Estate of J. Couper Lord, Benjamin Nicoll, Secretary, 68 Wall st., New York.

Carteret Steel Company, 31 Nassau st., New York City. Works at Carteret, Middlesex county. Built in 1896; one 5-gross-ton basic open-hearth steel furnace, erected for experimental purposes; product, half-ton ingots. Fuel, coal. Henry A. Jones, President; J. C. Davis, Secretary and Treasurer.

Cumberland Nail and Iron Company, Bridgeton, Cumberland county. Branch office, 207 Walnut Place, Philadelphia. Built in 1814; 10 double puddling furnaces, 4 heating furnaces, two 18-inch trains of rolls, and 90 cut-nail machines; steam and water power; product, cut nails and gas tubes; annual capacity, 140,000 kegs of cut nails and 3,200 gross tons of gas tubes. Fuel, bituminous coal. Brand, "Cumberland." Robert J. Buck, President, and Chester J. Buck, Vice-President, Bridgeton; John M. Reeves, Secretary and Treasurer, 207 Walnut Place, Philadelphia.

Dover Iron Works, The Dover Iron Company of New Jersey, Dover, Morris county. Built about 1770 and rebuilt several times; 5 double puddling furnaces, 2 heating furnaces, and 3 trains of rolls (10, 18, and 20-inch); steam and water power; product, bar iron, boiler rivets, socket bolts, and brace jaws; annual capacity, 5,500 gross tons. Fuel, bituminous coal. Brand for merchant bar, "Dover;" brand for rivets, "D." This company also manufactures "Ulster" iron for C. R. Mulligan, 139 Greenwich st., New York. George Richards, President; H. W. Crabbe, Secretary and Treasurer.

Harvey Steel Company, Brill's Station, Newark, Essex county. New York office, 52 Wall st. Built in 1889; 6 heating furnaces, one 10-inch train of rolls, (idle,) and 14 treating furnaces. Fuel, coal. Treats armor plate and other iron and steel products under the Harvey

patents. (Two 4-pot crucible steel-melting holes, formerly used for experimental purposes, abandoned.) Stephen S. Palmer, President; Thomas W. Harvey, Vice-President; William Allen Smith, Secretary and Treasurer.

Heller & Brothers Steel Works, Heller & Brothers, Newark, Essex county. Crucible steel works, built in 1882; 18 two-pot crucible steel-melting holes; annual capacity, double turn, 1,200 gross tons of ingots; 6 heating furnaces, 2 hammers, (one 2 and one 8-ton,) and one 10-inch train of rolls; product, crucible steel, used by the firm in manufacturing rasps, files, and other tools; annual capacity, single turn, 600 gross tons of rolled products. Fuel, coke.

Jersey City Spike and Bolt Works, W. Ames & Co., 312 Washington st., Jersey City, Hudson county. Built in 1850; 1 heating furnace, using producer gas, and one 10-inch train of rolls; use scrap iron only; product, spikes, splice joints, bolts, rivets, and round, flat, and square bar iron; annual capacity, 10,000 gross tons. Fuel, producer gas.

New York Switch and Crossing Company, Fifteenth and Madison sts., Hoboken, Hudson county. One 6-gross-ton acid open-hearth steel furnace, built in 1894; first steel made in August, 1894; three 6-pot crucible steel-melting holes, built in 1896-7; first crucible steel made January 14, 1897; product, special castings for horse, electric, cable, and steam railroads; annual capacity, 3,000 gross tons of open-hearth steel castings and 1,000 tons of crucible steel castings. Fuel, manufactured gas in the open-hearth steel furnace and oil in the crucible steel furnaces. (Formerly operated by the New York Frog and Switch Company.) W. C. Wood, President and Manager; H. R. Sherman, Secretary and Treasurer. The open-hearth and crucible steel furnaces are idle and for sale.

Oxford Iron and Nail Works, Oxford, Warren county. Built in 1866; 26 puddling furnaces, 2 regenerative gas heating furnaces, 4 Smith and 8 Taylor gas producers, using anthracite coal, 4 spike furnaces, 103 cut-nail machines, and 3 trains of rolls (one 12 and two 23-inch); product, bar iron and iron cut nails; annual capacity, 5,000 gross tons of bar iron and 200,000 kegs of nails. Brand, "Oxford." (Formerly operated by the Oxford Iron and Nail Company.) Owned by the Delaware, Lackawanna, and Western Railroad Company, Samuel Sloan, President, 26 Exchange Place, New York; Edmund T. Lukens, Agent, Oxford. For sale. *See Furnaces in New Jersey.*

Passaic Rolling Mills and Bridge Works, The Passaic Rolling Mill Company, Paterson, Passaic county. New York office, 45 Broadway. Built in 1867 and incorporated in 1869; 8 double puddling furnaces, (4 coal and 4 gas,) 9 gas heating furnaces, and 6 trains of rolls, (one puddle, one 9, one 18, one 23, and one 28-inch, and one 30-inch universal.) Steel department, added in 1889-90 and enlarged in 1894, contains three 20-ton open-hearth furnaces, (two acid and one basic,)

2 reheating furnaces, blooming mill, shears, and other hydraulic machinery. Product, structural material, including beams, channels, angles, tees, universal mill plates, and merchant bars; annual capacity, 13,500 gross tons of iron and 35,000 tons of open-hearth steel. The plant includes a bridgebuilding department, with modern outfit, including steel eye-bar plant; annual capacity of bridge shops, 24,000 gross tons. Fuel, manufactured gas. Brand, "Passaic." Watts Cooke, President; W. O. Fayerweather, Vice-President and Treasurer; A. C. Fairchild, Secretary; John K. Cooke, Superintendent.

Pompton Steel and Iron Company, Pompton, Passaic county. Built in 1863; 5 single puddling furnaces, 6 heating furnaces, 24 crucible steel-melting furnaces, with an annual capacity, single turn, of 1,780 gross tons of ingots; 2 trains of rolls, (one 9 and one 18-inch,) and 5 hammers; steam and water power; 48 pots can be used at each heat in steel works; product, crucible cast steel and railway car springs; annual capacity, single turn, 1,850 gross tons of rolled products and 150 tons of forged products. Fuel, anthracite and bituminous coal. Brand, "Pompton." James W. Cox, Jr., Vice-President; William E. Ludlum, Secretary and Treasurer; Joseph W. McElroy, Superintendent.

Roebling's (John A.) Sons Company, Trenton. Established in 1852; rolling mill rebuilt in 1873 and again in 1887; now used exclusively for rolling wire rods; it is a modified Garrett mill and has 2 Siemens gas heating furnaces. In addition to the iron and steel wire department the works consist of a wire-rope and cable department, a wire-cloth department, a barb-wire and wire-nail department, and a copper wire and insulated wire and cable department. Number of wire-nail machines, 21. Annual capacity for iron, steel, and copper wire, 32,000 gross tons; of rolling mill, 36,000 gross tons of wire rods. Fuel, manufactured gas and coal. Charles G. Roebling, President; Washington A. Roebling, Vice-President; Ferdinand W. Roebling, Secretary and Treasurer. Branch stores, 117 Liberty st., New York City; 173 Lake st., Chicago; 27 Fremont st., San Francisco.

Spaulding and Jennings (The) Company, (West Bergen Steel Works,) Jersey City, Hudson county. Telegraph address, West Bergen. Built in 1880; 20 heating furnaces, 11 annealing furnaces, 8 trains of rolls, (5 hot and 3 cold,) cold drawing plant with several blocks and one large draw bench, 7 hammers, and 24 four-pot crucible steel-melting holes; product, crucible cast steel, bright drawn steel, and flat cold-rolled steel; also rerolls Bessemer and open-hearth steel billets; annual capacity, single turn, 8,000 gross tons of rolled products and 2,000 tons of forged products. Fuel, coal. Brand for tool steel, the letter "J" in a diamond. Stephen W. Baldwin, President; Thomas H. Spaulding, Vice-President and Secretary; Robert E. Jennings, Treasurer and General Manager.

Taylor Iron and Steel Company, High Bridge, Hunterdon county.

Original works built about 1720 and abandoned about 1785; a portion of the present works built in 1851 and enlarged in 1866-70; rolling mill added in 1883; 1 single and 2 double puddling furnaces, 6 heating furnaces, one 2-high 18-inch train of muck rolls, one large steam helve hammer, and 3 water-power belt hammers; product, muck and scrap bar for car and locomotive axles and similar forgings; annual capacity, in axles, 7,000 gross tons. Steel department, for making Hadfield steel, added in 1892 and first steel made in September, 1892; product, Hadfield's manganese, chrome, and other steel castings. Fuel, coal and coke. Lewis H. Taylor, President; T. F. Budlong, Secretary and Treasurer; William B. Middleton, General Manager.

Trenton (The) Iron Company, Trenton, Mercer county. New York office, Cooper, Hewitt & Co., 17 Burling Slip. Built in 1845; 4 heating furnaces, 2 hammers, (one 2½ and one 3-ton,) and 4 trains of rolls (one 8, one 10, one 12, and one 20-inch); wire works, with 965 blocks; operates several trains of cold rolls for rolling round wire into flat wire; product, wire rods, merchant rods, iron and steel wire, cold-rolled steel, wire rope, and wire-rope tramways (Bleichert system) for transportation of material; annual capacity of rods, 18,000 gross tons. Fuel, coal and manufactured gas. Abram S. Hewitt, President, and Peter Cooper Hewitt, Treasurer, New York; William Hewitt, Vice-President, E. Hanson, Secretary, and Charles E. Hewitt, Managing Director, Trenton. Selling agents, Cooper, Hewitt & Co., New York.

Trenton Iron Works, New Jersey Steel and Iron Company, Trenton, Mercer county. New York office, Cooper, Hewitt & Co., 17 Burling Slip. Built in 1845; 12 double puddling and 13 heating furnaces, 7 trains of rolls, (one 8, one 12, three 20, and two 26-inch,) and one 3-ton hammer; product, iron and steel structural shapes, including beams, channels, angles, tees, and zeos, merchant bars, chains of all sizes, rivets, bolts, etc.; annual capacity, 22,500 gross tons. Fuel, manufactured gas. Brand, "Trenton." Works contain a complete plant for the construction of bridges, roofs, and all iron and steel structures; annual capacity, 30,000 gross tons. Edward Cooper, President, and Edwin F. Bedell, Secretary, New York; Charles E. Hewitt, Treasurer, and Joseph Stokes, Superintendent, Trenton.

Trenton Steel Company, Trenton, Mercer county. Built in 1891; one 7-gross-ton acid open-hearth steel furnace not yet put in operation; product, to be cast steel vises. Samuel K. Wilson, Treasurer. Owned by the Estate of Peter Wilkes, deceased. For sale.

Number of rolling mills and steel works in New Jersey: 21. Of these 5 make open-hearth steel, 6 make crucible steel, and 1 makes Hadfield steel.

PENNSYLVANIA.

PHILADELPHIA AND VICINITY.

Davis Brothers Rolling Mill, 995 North Second street, Philadelphia. Works, Canal st. near Germantown ave. Built in 1874; rebuilt in 1890; one heating furnace, two 10-inch trains of rolls, and 5 spike machines; product, bar iron, all consumed in the works in the manufacture of railroad, ship, bridge, and wharf spikes; annual capacity, single turn, 1,600 gross tons. Fuel, coal.

Ellwood Ivins' (The) Tube Company, 487 Broadway, New York City. Branch salesrooms, 101-103 Duane st., New York, and 165 Jackson st., Chicago. Works at Oak Lane Station, Philadelphia. Built in 1893 and first put in operation in 1894; 4 forge fires, 3 heating furnaces, and 2 trains of 21-inch rolls; product, blanks consumed by the company in the manufacture of seamless drawn steel tubes; annual capacity, 500 gross tons of blanks and 2,000,000 feet of steel tubes. Fuel, bituminous coal. This company was the first in America, and, with one exception, the first in the world, to make seamless drawn steel tubes. Ellwood Ivins, President; George Kelly, Vice-President; George I. Cook, Treasurer; L. E. Snively, Secretary.

Fair Hill Rolling Mill, Gaulbert, McFadden & Caskey, York and American sts., Philadelphia. Built in 1855; 4 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls; product, merchant bar iron; annual capacity, 11,000 gross tons. Fuel, bituminous coal. Brand, "Fair Hill Best." Ishmael James, Superintendent.

Fairmount Steel Works, Alexander Foster & Co., 2325 Spring Garden st., Philadelphia. Built in 1866; 3 heating furnaces, six 4-pot crucible steel-melting furnaces, and 3 hammers; product, frog plates and points, all kinds of steel forgings, and best American cast steel, suitable for shear knives, dies, lathe tools, etc.; annual capacity, single turn, 450 gross tons. Fuel, coal.

Hughes & Patterson, Richmond and Otis sts., Kensington, Philadelphia. Two works in Kensington, Philadelphia: Delaware Rolling Mill, at Richmond and Otis sts., operated by Hughes & Patterson, built in 1870; 10 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls. Philadelphia Iron and Tinplate Works, at Beach and Vienna sts., operated by Hughes & Patterson, Incorporated, built in 1858; 9 single puddling furnaces, 5 heating furnaces, and 3 trains of rolls. Product, bar iron specialties, skelp, bands, hoops, and rods; total annual capacity, 27,000 gross tons. Fuel, bituminous coal. Brands, "H. & P. Best," "H. & P. Best-best," and "H. & P. Stay-bolt." Officers of Hughes & Patterson, Incorporated: R. J. Hughes, President and Secretary; Walter Hatfield, Vice-President and Treasurer. *See Tinplate Works in Pennsylvania, (Philadelphia Iron and Tinplate Works.)*

Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, (incorporated,) Tacony, Philadelphia. Branch offices: Boston, Mass.; Chicago, Ill.; Louisville, Ky.; New Orleans, La.; and San Francisco, Cal. Manufacture of saws started in 1840 and steel in 1854; one 30-ton cementing furnace, one 30-pot and three 24-pot crucible steel-melting furnaces; first rolling mill built in 1866; 2 forge fires, 4 trains of rolls, (two 16 and one 20-inch sheet and one 28-inch plate,) 12 coal and 2 gas (Loomis) heating furnaces, and 2 hammers (one 2-ton and one 1,200-lb.); product, principally saw steel of every description, engravers' plates, and sheet steel for all other purposes; annual capacity, 7,000 gross tons of crucible ingots and 5,380 gross tons of rolled products. The works also have an 18-inch train for band saws and a 9-inch guide mill; product, bar steel of all kinds; annual bar and rod rolling capacity, 2,700 gross tons. The steel works were originally built in Philadelphia, and were removed to Tacony in 1879, 1881, 1883, and 1884. Fuel, manufactured gas. Brand, "Disston." Horace C. Disston, President; William Disston, Vice-President; Jacob S. Disston, Treasurer; Robert J. Johnson, Assistant Treasurer; Samuel Disston, Secretary and General Manager.

Midvale (The) Steel Company, Nicetown, Philadelphia. This company declines to give a description of its works for publication in the Directory.

Oxford Iron and Steel Works, William & Harvey Rowland Incorporated, Frankford, Philadelphia. Built in 1835 on Tacony creek, 2 miles west of Frankford, and removed to present location in 1849; began making steel in 1845; 5 heating furnaces, 4 trains of rolls, (two 12, one 16, and one 18-inch,) one hammer and 2 cementing furnaces; product, Bessemer and open-hearth sheet, machinery, spring, hammer, fork, rake, and hoe steel; reroll Norway iron and nail rods; also manufacture carriage and wagon springs of every description; annual capacity, double turn, 10,000 gross tons of rolled products. Fuel, bituminous coal. Brand for springs, "W. & H. Rowland." (Crucible steel plant, containing 16 two-pot crucible steel-melting furnaces, abandoned.) Edward Rowland, President; Joseph G. H. Miller, Vice-President; Charles Rowland, Treasurer; William Rowland, Secretary.

Pencoyd Iron Works, A. and P. Roberts Company, 261 South Fourth st., Philadelphia. Works in Montgomery county, opposite Manayunk. Built in 1852; 10 regenerative gas heating furnaces, 3 coal-fired heating furnaces, and 5 trains of rolls, (one 12, two 23, one 28, and one 2-high 36-inch reversing.) Steel department, added in 1887 and since enlarged, contains nine 30-gross-ton open-hearth furnaces (8 basic and 1 acid); annual capacity, 160,000 gross tons of ingots. Forge shop has 5 hammers, (one 2-ton, two 3-ton, one 4-ton, and one 20-ton.) Product, open-hearth steel channel bars from 2 to 15 inches,

beams from 3 to 24 inches, deck beams from 5 to 12 inches, tees from 1 to 6 inches, angles from 1 to 8 inches, flats from 1 to 12 inches wide, rounds from $\frac{1}{2}$ inch to 7 inches in diameter, hammered or rolled axles, bar and bridge steel, shafting, and steel blooms; annual capacity, 150,000 gross tons of finished material. Specialties, structural shapes, axles, shafting, and bar and bridge steel. Brand, "Pencoyd." Bridge and Construction Department contains equipment for all classes of bridge and architectural work; also standard railroad turntables; also hydraulic forge shop for the manufacture of solid forged steel eye-bars from 3 to 12 inches wide; annual capacity, 50,000 gross tons. Fuel used in all departments, bituminous coal. Percival Roberts, Jr., President; P. W. Roberts, 1st Vice-President; Frederick Snare, 2d Vice-President; J. W. Davis, Secretary and Treasurer. General office, 261 South Fourth st., Philadelphia; New York office, American Surety Building, 100 Broadway, Frederick Snare, 2d Vice-President; Boston office, Brazer Building, State and Devonshire sts., W. B. Ogram, sales agent; Chicago office, Fisher Building, Van Buren and Dearborn sts., William V. Kelley, sales agent for railway material, and Rookery Building, E. W. Cramer, sales agent for all products except railway material; St. Louis, Security Building, Good & Waterman, sales agents.

Penn Treaty Iron Works, Marshall Brothers & Co., Beach and Marlborough sts., Philadelphia. Built in 1856; 3 heating furnaces and one 3-high puddle mill, one 3-high bar mill, and one 26 x 36 and five 24 x 32-inch tinplate mills, all hot; also six 20 x 36-inch cold mills; product, sheet and black plates for tinning; annual capacity, 7,500 gross tons. Fuel, bituminous coal. *See Tinplate Works in Pennsylvania.* Number of rolling mills and steel works in Philadelphia and vicinity: 11. Of these 2 make open-hearth steel, 3 make crucible steel, and 2 make blister steel.

EASTERN PENNSYLVANIA, EXCEPT PHILADELPHIA.

Allentown (The) Rolling Mills, 229 Drexel Building, Philadelphia. Two mills at Allentown, Lehigh county: Allentown Rolling Mills, built in 1860; 2 single and 23 double puddling furnaces, 9 heating furnaces, (7 coal and 2 fuel oil,) and 8 trains of rolls; product, iron I beams, channels, angles, merchant bars, spikes, bolts, nuts, rivets, axles, machinery, bridge work, and mine and flat cars; annual capacity, 18,000 gross tons. Glen Iron Works, first put in operation in 1870; 8 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 8 $\frac{1}{2}$ and two 15-inch); product, puddled bar, tops and bottoms, and spike rods; annual capacity, 7,000 gross tons. H. M. Howe, President, 229 Drexel Building, Philadelphia; H. W. Allison, Secretary, Treasurer, and General Manager, Allentown. *See Furnaces in the Lehigh Valley, Pennsylvania.*

Allentown Works, American Steel and Wire Company, Allentown, Lehigh county. General office, Rookery Building, Chicago; branch offices and warehouses, New York City, Pittsburgh, Cleveland, Louisville, St. Louis, New Orleans, Denver, San Francisco, Portland, Oregon, Montreal, Canada, and London, England. Built in 1889 by the Iowa Barb Wire Company; 3 gas heating furnaces, 4 trains of rolls, (9, 10, 14, and 16-inch,) and 166 wire-nail machines; product, wire rods drawn into wire and chiefly used by the company in the manufacture of barbed wire and wire nails; annual capacity, 75,000 gross tons of wire rods and 600,000 kegs of wire nails. Fuel, coal and manufactured gas. Brands, "Iowa Barb Wire," "Consolidated Field Fencing," and "Baker Perfect Barb Wire." F. E. Patterson, Manager, and T. P. Alder, Assistant Manager, New York. A galvanizing plant is connected with the works. Sales made by the New York office. (Formerly operated by the Consolidated Steel and Wire Company.) Officers at Chicago: John W. Gates, Chairman; John Lambert, President; William Edenborn, 1st Vice-President; Isaac L. Ellwood, 2d Vice-President; Stewart H. Chisholm, 3d Vice-President; E. T. Schuler, Treasurer; E. J. Buffington, Secretary; Frank Baackes, General Manager; C. H. Garvey, Auditor; Elbert H. Gary, General Counsel; E. C. Lott, General Sales Agent; E. J. Buffington and C. S. Roberts, Assistant General Sales Agents. E. R. Pool, Denver, sales agent for Colorado, Utah, Wyoming, and Montana; W. W. Bierce, New Orleans, sales agent for Louisiana, Mississippi, Alabama, Georgia, Florida, North Carolina, and South Carolina. *See Pittsburgh Works in Allegheny County and Beaver Falls Works in Western Pennsylvania. See also American Steel and Wire Company in Ohio, (Lake Counties District,) and Anderson Works in Indiana.*

Bethlehem (The) Iron Company, South Bethlehem, Northampton county. Main office, South Bethlehem; Philadelphia office, 421 Chestnut st.; New York office, 80 Broadway; Chicago office, Marquette Building. Established in 1860. Iron mills started in 1863; Bessemer steel works started in 1873; one single and 7 double puddling furnaces, 1 forge fire, 19 heating furnaces, (6 ordinary reverberatory and 13 bituminous coal, gas, and fuel oil,) 45 gas producers, 8 trains of rolls, (10, 12, 21, 22, 25, 28, 32, and 48-inch,) and 5 hammers, ranging from 1,500 pounds to 10 tons each; four 7½-gross-ton Bessemer steel converters; first blow made October 4, 1873; first steel rail rolled October 18, 1873; 8 iron cupolas, 4 spiegel cupolas, and 4 soaking pits; product, iron and steel rails, billets, beams, tees, angles, puddled bars, merchant iron and steel, ingots, axle, spring, screw, and wire steel, etc., and castings; annual capacity, 205,000 gross tons of rails, 55,000 tons of merchant forms, and 250,000 tons of ingots. Forging and Plate Department, making open-hearth steel: first steel melted August 11, 1888; 7 completed open-hearth steel furnaces (6 acid and 1

basic) and one furnace not yet lined (one 10, one 20, and five 40-gross-ton completed and one 40-gross-ton not lined); an ingot weighing 104 gross tons has been cast; annual capacity of ingots, about 60,000 gross tons. This department also contains 4 soaking pits, 5 reheating furnaces, 29 bituminous gas producers, and 3 trains of rolls (26, 32, and 34-inch); product, ship plate, boiler plate, tank, slabs, and special billets. Connected with the open-hearth furnaces is a plant for the fluid compression of steel, containing 3 hydraulic forging presses, (one 2,000, one 5,000, and one 14,000-tons' pressure,) one hammer with a falling weight of 125 gross tons, 5 hammers for making small forgings, one 7,000-ton bending press, 3 oil-tempering and annealing plants, (two for gun and other forgings and one for armor plate,) and one plant for treating armor by the cementation process. This department also contains 46 gas producers and 46 heating furnaces, 2 machine shops, (one for general work, rough-machining and finishing forgings, and for finishing heavy ordnance, and one for trimming and machining armor plates,) and a blacksmith shop and steel foundry. Product, steel forgings of all descriptions and of the largest dimensions and weight, including marine and stationary engine cranks, (forged solid or built-up,) shafting, (forged solid or hollow,) gun carriages, heavy ordnance of all calibres, and forged armor plates, including conning towers, shields, etc.; also billets of low-phosphorus steel of all grades. The department is fully equipped with all necessary appliances and machinery for filling the requirements of the Government and ship and engine builders of the country for heavy steel shafting and miscellaneous forgings of the best quality. Fuel, manufactured gas. Robert P. Linderman, President; Robert H. Sayre, Vice-President; R. W. Davenport, 2d Vice-President; Abraham S. Schropp, Secretary; C. O. Brunner, Treasurer; Owen F. Leibert, General Superintendent; Robert H. Sayre, Jr., Assistant Superintendent; Edward M. McIlvain, General Sales Agent. *See Furnaces in the Lehigh Valley, Pennsylvania.*

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro, Berks county. Built in 1848; 16 double puddling furnaces, 4 heating furnaces, 2 trains of rolls, and 118 cut-nail machines; steam and water power; product, nails, muck bar, and skelp; annual capacity, 250,000 kegs of cut nails and 16,500 gross tons of muck bar and skelp. Fuel, bituminous coal. Brand, "Anchor." Bessemer steel department contains two small tilting converters; first blow made September 21, 1885; idle; annual capacity, 18,000 gross tons of ingots. Edward Brooke, President; Wm. deB. Brusstar, Secretary; George W. Harrison, Treasurer. Selling agents, C. J. Stebbins, 103 Reade st., and Patterson Brothers, 27 Park Row, New York. *See Keystone Furnaces, Schuylkill Valley, Pennsylvania.*

Blandon Rolling Mill, Simon Seyfert, Reading. Works at Blandon,

Berks county. Built in 1867 and enlarged and improved in 1880, 1887, 1890, 1891, and 1892; 1 single and 6 double puddling furnaces, 3 heating furnaces, rotary squeezers, and 3 trains of rolls (one muck, and one 8 and one 11-inch finishing); product, merchant bars, horse-shoe iron, rods, ovals, half ovals, half rounds, hoops, bands, cotton-ties, grooved pipe skelp, and special shapes; annual capacity, 15,000 gross tons. Also rolls all sizes and kinds of soft steel. Fuel, bituminous coal. (Formerly operated by the Blandon Iron and Steel Company.) *See Gibraltar Iron Works in Eastern Pennsylvania.*

Brandywine Rolling Mills, Worth Brothers Company, Coatesville, Chester county. Built in 1881-2 and put in operation in February, 1882; 5 heating furnaces and 3 trains of rolls, (20 and 28-inch and one 3-high 36 x 132-inch.) Commenced rolling steel in January, 1885, and have constantly increased this branch. Plant also includes a plate straightening machine, a large guillotine shear with knives 154 inches long, and a complete flanging and dishing plant. Product, plates for best boiler, locomotive, and tank and structural work, all sizes of machine-flanged and dished heads and machine-flanged man-holes, saddles, etc.; annual capacity, 50,000 gross tons of plates. Two 35-gross-ton open-hearth steel furnaces (1 acid and 1 basic) added in 1896; first open-hearth steel made in June, 1896; annual capacity, 30,000 gross tons of ingots. Fuel, coal. *See Viaduct Iron Works in Eastern Pennsylvania.*

Bristol Rolling Mill, Rodman Wister, Trustee, 672 Bullitt Building, Philadelphia. Works at Bristol, Bucks county. Built in 1875-6; 2 puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 8, one 12, and one 18-inch); product, bar, band, hoop, and scroll iron, and cotton-ties; annual capacity, 9,000 gross tons of finished iron. Brand, "Bristol." Idle and for sale.

Bryden Horse Shoe Works, Bryden Horse Shoe Company, Catasauqua, Lehigh county. Philadelphia office, Southwest cor. Fourth and Chestnut sts. Built in 1888 and put in operation in January, 1889. Rolling mill department, added in 1889-90, contains 2 heating furnaces and two 9-inch trains of rolls. Press and forge departments contain 9 heating furnaces, 8 benders, 8 presses, two 1,200-lb. hammers, and trimming, clipping, punching, and cleaning machinery. Product, "Boss" and "Bryden" forged horse and mule shoes, made from purchased muck bar, and "Covington and Kent" racing plates from the best grades of steel; annual capacity, single turn, 6,000 gross tons. Fuel, bituminous coal. Other brands, "Banner," "Dixie," "Empire," and "Bronco." Charles K. Barns, President, Philadelphia; T. F. Frederick, Secretary, Oliver Williams, Treasurer, and Jacob Roberts, Superintendent, Catasauqua.

Carpenter Steel Company, Reading, Berks county. New York office, 1 Broadway. Original plant, containing 8 crucible steel-melting holes,

built in 1889 and first steel made in July, 1889; removed to present site in 1889-90 and works destroyed by fire on December 26, 1891; rebuilt and put in operation in 1892; 5 double puddling furnaces, 34 heating, welding, and annealing furnaces, 4 trains of rolls, (one 7, one 10, and one 16-inch for hot rolling and one 10-inch for cold rolling,) 10 hammers, (one 600-lb., one 750-lb., three 1,000-lb., one 1,500-lb., one 1,800-lb., one 3,500-lb., one 3-ton, and one $7\frac{1}{2}$ -ton,) one 30-pot gas-fired crucible steel-melting furnace, and 40 four-pot direct-fired steel-melting holes. Product, crucible steel for tool steel, cutlery, springs, etc., forgings and armor-piercing projectiles for the Government, and air-hardening steel for general tool-making purposes; annual capacity, 5,000 gross tons of crucible steel ingots and 6,000 gross tons of rolled and forged products. Fuel, anthracite and bituminous coal and coke. Brands, Carpenter "Air Hardening," "Double Special," "Extra," "Standard Special," "Standard," "Comet," and "Titan." Also operates a machine shop with 64 lathes, borers, and drills, and a small wire-drawing plant. John C. Barron, President; Henry M. Hawkesworth, 1st Vice-President; W. B. Kunhardt, 2d Vice-President; Lewis Gregory, Secretary and Treasurer; Robert W. Hawkesworth, Chairman of Board of Directors. Sales offices and warerooms: 15 Platt street, New York City; 9 South Canal street, Chicago, Illinois; 407 Washington street, Toledo, Ohio. *See Diamond Steel Works in Eastern Pennsylvania.*

Catasauqua Manufacturing Company, Catasauqua, Lehigh county. Company organized in 1864. Four mills: A and C at Catasauqua and B and D at Ferndale; 30 single and 10 double puddling furnaces, 14 reverberatory heating furnaces, one Smith gas reheating furnace, 10 trains of rolls, (two 3-high and one 18-inch 2-high muck, two 10, one 15, one 18, and one 21-inch bar, and one 22-inch and one 31-inch 3-high plate,) and one 10-ton hammer; product, high-grade tank, ship, bridge, and boiler plates, merchant bars, bands, shapes, axles, angles, and skelp iron or steel; annual capacity, 40,000 gross tons. Receivers appointed March 4, 1896; plant sold to satisfy mortgage January 2, 1897, and bought by committee of bondholders; now held by Nathan Trotter, Chairman, 36 North Front st., Philadelphia, and James B. Thompson and Richard Downing. J. S. Elverson, Agent, Catasauqua. For sale.

Chester Steel Castings Company, 407 Library st., Philadelphia. Works at Chester, Delaware county. Built in 1871; one 15-gross ton acid open-hearth steel furnace erected in 1893 and first steel made in May, 1893; 2 gas producers; adding one 20-gross-ton acid open-hearth steel furnace and 3 new gas producers; product, steel castings of every description from 1 to 40,000 lbs.; also produces castings by the McHaffie process; annual capacity, single turn, 7,000 gross tons. Fuel, coal and oil. (Two 1-gross-ton Robert-Bessemer steel converters, built

in 1889, abandoned.) E. P. Dwight, President and Treasurer; A. G. Lorenz, Secretary; J. J. Deemer, Superintendent.

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, Conshohocken, Montgomery county. General office, 223 North Second st., Philadelphia. Built in 1832, 1852, and 1864, respectively; rebuilt in 1882-3; 7 double puddling furnaces, 7 heating furnaces, and 8 trains of rolls, one of which is a 3-high 72-inch plate train; steam and water power; product, sheet, flue, and plate iron of all kinds; corrugated iron a specialty; annual capacity, 20,000 gross tons. Fuel, bituminous and anthracite coal. Brands, "Blue Annealed" iron and steel, "Hope," "Anchor," "R. G.," "Special Electric," "Best Bloom," and "Soft Steel." John Wood, President; George W. Wood, Vice-President and General Manager; Charles M. Wood, Secretary; William M. Wood, Treasurer. Selling agents, A. C. Jessup, 139 Greenwich st., New York; W. E. Clark, 8 Oliver st., Boston; Scully Steel and Iron Company, Chicago. *See Plymouth Rolling Mill in Eastern Pennsylvania.*

Crum Lynne Iron and Steel Company, Crum Lynne, Delaware county. Built in 1887-8; 2 double and 4 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, (one 12 and one 18-inch,) one 2½-ton hammer, and one rotary squeezer; product, muck bar, bar iron, grooved iron and steel skelp, and charcoal boiler tube skelp; annual capacity, 10,000 gross tons. Fuel, bituminous coal. May add another double puddling furnace. Charcoal refinery fires are connected with the works for the manufacture of blooms. (Formerly operated by the Crum Creek Iron and Steel Company.) Walter E. Rex, President; J. Jones Hudson, Treasurer and General Manager.

Diamond Steel Works, Carpenter Steel Company, lessee, Reading, Berks county. Built in 1892 and first put in operation in March, 1893; 2 forge fires, 6 heating furnaces, 3 trains of rolls, (one 10, one 12, and one 14-inch,) 2 hammers, (one 1,000-lb. and one 3,000-lb.,) and twenty 4-pot direct-fired crucible steel-melting holes; product, special steel for tools, dies, and projectiles; annual capacity, 1,500 gross tons of crucible steel ingots and 11,000 tons of rolled and forged products. Trains of rolls are idle. Fuel, anthracite coal. (Formerly operated by the Diamond Steel Company; later by the Reading Steel Company.) Owned by Garrett B. Stevens, Reading. *See Carpenter Steel Company in Eastern Pennsylvania.*

Douglassville Iron Company Limited, Douglassville, Berks county. Built as a forge in 1878; rolling mill added in 1887 and enlarged in 1890; 6 double puddling furnaces, one hammer, one rotary squeezer, and one train of rolls; product, muck bar; annual capacity, 7,000 gross tons. Fuel, bituminous coal. D. K. Flannery, President and Manager; F. R. Gerhart, Secretary; John H. Egolf, Treasurer.

Easton Sheet Iron Works, Theodore Oliver, Easton, Northampton

county. Started February 1, 1872; one single and one double puddling furnace, one heating furnace, one anthracite coal sheet furnace, one bituminous coal annealing furnace, and one train of 22-inch rolls; product, steel and refined sheets; annual capacity, 1,000 gross tons. Fuel, anthracite and bituminous coal. Brand, the letter "R" in a diamond.

Eureka Cast Steel Company, Samuel Lees, Receiver, Chester, Delaware county. Works at Lamokin, one mile south of Chester. Built in 1877. Open-hearth steel plant added in 1891 and first steel made June 25, 1891; one 20-gross-ton acid open-hearth furnace; annual capacity, 5,000 gross tons of castings. The company also produces "Eureka Steel" castings; annual capacity, 700 gross tons. Specialties, all forms of railroad and machinery castings. Works partly destroyed by fire on August 8, 1893; rebuilt in same year and put in operation December 2, 1893, a machine shop being added. Fuel, producer gas. (Crucible steel plant, erected in 1885, abandoned in 1893.) E. H. Johnston, President; Samuel Lyons, Treasurer; H. B. Faunce, Secretary.

Gibraltar Iron Works, Simon Seyfert, Reading, Berks county. Built in 1846 and rebuilt in 1883-4; 2 heating furnaces and one 18-inch train of rolls; product, boiler plate and boiler tube and pipe iron; annual capacity, 3,600 gross tons. A forge connected with the works was rebuilt in 1846 and again in 1891; it has 6 charcoal forge fires and one 4-ton steam hammer; steam and water power; product, charcoal blooms, all consumed in the rolling mill; annual capacity, 3,000 gross tons. Fuel, bituminous coal. *See Blandon Rolling Mill in Eastern Pennsylvania.*

Glasgow Iron and Steel Works, Glasgow Iron Company, Pottstown, Montgomery county. Works in ninth ward. Main office, Pottstown; Philadelphia office, Fidelity Building. Puddle mill built in 1874; 8 double puddling furnaces and one train of muck rolls; rotary squeezer; steam and water power; annual capacity, 10,000 gross tons. Plate mill No. 1, built in 1875; 3 heating furnaces and one train of rolls 96 inches long; annual capacity, 12,000 gross tons of steel plates. Plate mill No. 2, completed in 1889; 2 large gas heating furnaces; one train of rolls; rotary shears; annual capacity, 12,000 gross tons of iron and steel plates. Complete flanging and dishing plant and plant for making buckled plates connected with this mill. Product, muck bar, iron and steel bridge, tank, and boiler plate, flanged and dished boiler heads, man-holes, man-hole saddles for boilers, etc., and buckle plates. Specialties, "Glasgow" marine steel and "Glasgow" extra locomotive steel. Fuel, manufactured gas and bituminous coal. (Clapp-Griffiths steel plant, built in 1885-6, abandoned.) The company also operates under lease the lower works of the Pottstown Iron Company, at Pottstown. Comly B. Shoemaker, President; Oli-

ver E. Shuler, Treasurer; Harry W. Prizer, Secretary. Selling agents, D. F. Cooney, 88 Washington st., New York; Harrington, Robinson & Co., Telephone Building, Boston. *See Pottstown Iron Works in Eastern Pennsylvania.*

Keystone Iron Works Limited, Reading, Berks county. Built in 1857; 6 single puddling furnaces, 2 heating furnaces, and one 18-inch train of rolls; product, boiler plate, skelp, tank, chute, boat, and car iron, and muck bar; annual capacity, 5,500 gross tons. Fuel, bituminous coal. H. M. M. Richards, Chairman; J. H. Craig, Secretary and Treasurer.

Keystone Nail Works, Ellis and Lessig Steel and Iron Company Limited, Pottstown, Montgomery county. Built in 1884-5; rebuilt in 1894; 22 double puddling furnaces, 2 regenerative gas heating furnaces, one 9-inch and four 22-inch trains of rolls, and 105 cut-nail machines; product, muck bar, shovel, tack, and nail plate, and "Keystone" iron and steel cut nails; annual capacity, 27,000 gross tons of muck bar, 14,500 tons of tack, nail, and shovel plate, and 300,000 kegs of nails. Fuel, bituminous coal. Will add two 40-gross-ton basic open-hearth steel furnaces, with an estimated annual capacity of 60,000 gross tons of ingots and a 46-inch universal mill with 5 heating furnaces. George B. Lessig, Chairman and Manager; J. B. Lessig, Secretary and Treasurer.

Longmead Iron Works, Longmead Iron Company, Conshohocken, Montgomery county. Built in 1882 and put in operation in November, 1882; enlarged in 1894; 6 double puddling furnaces, 1 gas producer, 1 gas heating furnace, and 2 trains of rolls (one 20-inch muck and one 16-inch skelp); product, muck bar and grooved skelp iron; annual capacity, 10,000 gross tons of muck bar or 9,000 tons of skelp iron. Fuel, manufactured gas and bituminous coal. Jawood Lukens, President and Treasurer; A. L. Murphy, Secretary; S. Anderson, Superintendent. Selling agent, Lewis N. Lukens, 434 Drexel Building, Philadelphia.

Lukens Iron and Steel Company, Coatesville, Chester county. Philadelphia office, Fidelity Building; Boston office, 8 Oliver st.; New York office, 29 Broadway; New Orleans offices, 535 Delta st. and 536 South Front st. Built in 1810; 3 double puddling furnaces, 9 heating furnaces, (5 reverberatory and 4 specially large Siemens,) 8 gas producers, 3 trains of rolls, (one being a 3-high mill with chilled rolls 120 x 34 inches and hydraulic automatic tables,) 1 hammer, large guillotine shears with knives 110 inches long, and 1 new 110-ton hydraulic guillotine shear, with knives 14 feet long, capable of shearing plates 2 inches thick when cold; steam and water power; product, all kinds of boiler and ship plates, bridge iron, and homogeneous steel plates; also machine-flanged boiler heads and patent hydraulic-pressed boiler braces; annual capacity, 60,000 gross tons.

The puddle mill, operated by steam and water power, occupies the site of the first mill which made boiler plates in the United States. Two 30-gross-ton acid open-hearth steel furnaces, with hydraulic ladle, ingot cranes, and 8 gas producers, erected in 1891 and first steel made early in 1892; two 35-gross-ton acid furnaces added in 1894, with 6 gas producers, and two 35-gross-ton basic furnaces added in 1896; product, ingots for steel plates; annual capacity, 75,000 gross tons of ingots. Fuel, manufactured gas and bituminous coal. A. F. Huston, President; Charles L. Huston, Vice-President; Joseph Humpton, Secretary and Treasurer. Selling agents, A. M. Castle, Chicago; Western Iron and Supply Company, St. Louis; R. C. Hoffman & Co., Baltimore; J. F. Corlett, Cleveland; Charles Neblett, Cincinnati; Thomas Robertson & Co., Montreal, Canada.

McIlvain (William) & Sons' Boiler Plate Mill, Wm. McIlvain & Sons, Reading, Berks county. First put in operation in 1857; 2 double and 4 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, (break-down rolls 52 x 25 inches and finishing rolls 81 x 25 inches,) and one 3-ton hammer; product, every variety of steel and iron plates; annual capacity, 9,000 gross tons. Fuel, bituminous coal. Brand, "McIlvain." For sale.

Millholland Tube Company, Reading, Berks county. Built in 1894 and put in operation the same year; 2 heating furnaces, 1 forge fire, 1 hammer, and 1 train of rolls; product, seamless drawn steel tubes; annual capacity, 1,000,000 feet of seamless drawn tubes. Fuel, coke and anthracite and bituminous coal. M. B. McKnight, President; R. T. Leaf, Secretary; Henry Millholland, Treasurer and Manager.

Norristown Iron Works, Executors Estate of James Hooven, Norristown, Montgomery county. Built in 1846; 6 double puddling furnaces, 3 heating furnaces, 3 trains of rolls, (one 10 and two 18-inch,) one hammer, and 2 butt-welded-pipe furnaces using petroleum for fuel; product, skelp iron, part of which is made by the works into butt-welded pipes and the remainder sold; annual capacity, 5,000 gross tons. For sale or lease. *See Furnaces in the Schuylkill Valley, Pennsylvania.*

Norristown Works, The American Steel Casting Company, Thurlow. Works at Earnest Station, Norristown, Montgomery county. Built in 1890-1 and first steel made September 3, 1891; two 15-gross-ton acid open-hearth steel furnaces; product, open-hearth steel castings of every description; annual capacity, 5,400 gross tons. (Formerly operated by the Norristown Steel Company.) *For list of branch offices and full list of officers see Thurlow Works. See Syracuse Works in New York, Thurlow Works in Eastern Pennsylvania, Pittsburgh Works in Allegheny County, Sharon Works in Western Pennsylvania, and Alliance Works in Ohio, (Interior Counties District.)*

Parkesburg Iron Works, The Parkesburg Iron Company, Parkesburg,

Chester county. First started in April, 1873; enlarged in 1887 and 1889; 3 double puddling furnaces, 12 charcoal finery fires, 9 heating furnaces, one 20-inch train of 3-high muck rolls, three 2-high plate trains, (two 23 x 50 inches and one 23 x 60 inches,) and 3 hammers; product, boiler tube skelp iron; annual capacity, 11,000 gross tons. Fuel, charcoal in the forge and bituminous coal in the heating furnaces. Brand, "P. I. Co." William H. Gibbons, President; Horace A. Beale, Jr., Vice-President; W. C. Michener, Secretary; George Thomas, 3d, Treasurer; A. Jackson Williams, General Manager.

Penn Steel Casting and Machine Company, Chester, Delaware county. Built in 1892 and first steel made September 25, 1892; two 20-gross-ton acid open-hearth steel furnaces and 2 annealing furnaces; product, steel castings; annual capacity, single turn, 6,500 gross tons. Also manufactures cast steel pipe. Fuel, manufactured gas. M. H. Bickley, President; John T. Dickson, Secretary; Charles W. Andrew, Treasurer; Frederick Baldt, Manager.

Phoenix Iron Works, Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville, Chester county. Original works built in 1808. New mill built in 1873; 3 small, 10 large, and 3 double Siemens heating furnaces, 24 Siemens and 39 other gas producers, and 5 trains of rolls, (one 9, one 13, two 20, and one 24-inch.) Steel works built in 1888-9; four 20-gross-ton open-hearth steel furnaces (one acid and three basic) and blooming mill; first steel made in February, 1889. Product, bars, beams, channels, angles, tees, miscellaneous structural shapes of open-hearth steel, and steel castings; total annual capacity, 50,000 gross tons. Fuel, bituminous coal. David Reeves, President; W. H. Reeves, General Superintendent; George Gerry White, Secretary; James O. Pease, Treasurer.

Pine Iron Works, Joseph L. Bailey, Pine Iron Works P. O., Berks county; telegraph address, Manatawny Station. Glendale Mill, built in 1881; 2 heating furnaces and one train of 84 x 26-inch rolls; product, iron and steel plates of all kinds; annual capacity, 5,000 gross tons. Fuel, bituminous coal. Brands, "Pine" iron and "Pine" steel for the most severe requirements. (Formerly operated by Joseph L. Bailey & Son. Pine Mill, built in 1845, and run by water-power, has been abandoned.)

Plymouth Rolling Mill, J. Wood and Brothers Company, lessee, Conshohocken, Montgomery county. Built in 1881-2; 8 double puddling furnaces, 6 heating furnaces, 4 trains of rolls, (one 22-inch bar, and one 22 x 44, one 22 x 56, and one 22 x 60-inch plate and sheet,) and 12 cut-nail machines (idle); product, muck bar, plate and sheet iron, and plate and sheet steel; annual capacity, 9,000 gross tons of muck bar and 10,500 tons of finished material. Fuel, bituminous coal. Brands, "Soft Steel" and "Blue Annealed" iron and steel. Selling

agents, A. C. Jessup, New York; W. E. Clark, Boston. Owned by R. D. Wood & Co., Philadelphia. *See Conshohocken, Pennsylvania, and Corliss Iron Works in Eastern Pennsylvania.*

Pottsgrove Iron Works, Potts Brothers Iron Company Limited, Pottstown, Montgomery county. Built in 1846; 8 double puddling furnaces, 4 heating furnaces, and 2 trains of rolls; product, boiler plate, tank, flue, and pipe iron, and muck bar; annual capacity, 9,000 gross tons of muck bar and 11,000 tons of plate iron. Specialties, pipe and flue iron. Fuel, bituminous coal. George H. Potts, Chairman; H. C. Hitner, Secretary and Treasurer.

Pottstown Iron Works, Glasgow Iron Company, lessee, Pottstown, Montgomery county. Philadelphia office, Fidelity Building. Built in 1863 and enlarged in 1867; 22 double puddling furnaces, 13 Siemens heating furnaces, 95 cut-nail machines, one hammer, and 8 trains of rolls (18-inch muck, 21-inch muck, 23-inch muck, 23-inch nail plate, 60-inch plate, 65-inch plate, 112-inch plate, and a universal mill on which can be rolled plates up to 36 inches in width); product, muck bar, cut nails, and boiler, ship, bridge, and tank plate; annual capacity, 35,000 gross tons of muck bar, 50,000 tons of plates, and 250,000 kegs of cut nails. (The equipment mentioned above is owned by the Pottstown Iron Company and is leased to the Glasgow Iron Company. The lease does not cover the steel plant described below nor the blast furnace, both of which are idle.) Steel works, built in 1885-6, contain three 10-gross-ton Basic-Bessemer converters and a 36-inch blooming mill; first blow made July 1, 1886; one 12-gross-ton Siemens basic open-hearth steel furnace, built in 1885-6; product used in making nail plate and other plate and merchant steel. Officers of the Pottstown Iron Company: Andrew Wheeler, President; Austin Heckscher, Vice-President; Andrew Wheeler, Jr., Secretary; Charles H. Ashburner, Treasurer. Philadelphia office, 400 Chestnut st. *See Glasgow Iron and Steel Works in Eastern Pennsylvania. See Anvil Furnace, Schuylkill Valley, Pennsylvania.*

Pottsville Rolling Mills, Pottsville Iron and Steel Company, Pottsville, Schuylkill county. Original mill built to make rails in 1852; rebuilt and altered to make shapes in 1877; 12 heating furnaces and 4 trains of rolls (one 12, two 19, and one 23-inch); product, iron and steel beams, channels, angles, tees, bars, and shafting; annual capacity, single turn, 35,000 gross tons. Steel department contains two 20-gross-ton basic open-hearth steel furnaces built in 1890; first steel made in August, 1890; product, billets, blooms, and ingots for company's use and for sale; annual capacity, single turn, 35,000 gross tons. Blooming mill, built in 1887, contains 32-inch rolls for blooming ingots. Fuel, coal and manufactured gas. William Atkins, President and Treasurer; John M. Callen, Secretary. *See Pioneer Furnaces, Schuylkill Valley, Pennsylvania.*

Reading Bolt and Nut Works, (not incorporated,) J. H. Sternbergh & Son, Reading, Berks county. Bolt and nut works established in 1865, rolling mill department organized in 1870, and the whole enlarged in 1872, 1880, and 1886; entire works, except rolling mill, destroyed by fire February 6, 1891, and rebuilt on a larger scale in the same year; again enlarged in 1895 and in 1896; 6 heating furnaces, 5 trains of rolls, (one 9, two 10, one 12, and one 18-inch,) 1 power hammer, and 2 drop hammers; product, refined merchant bar and bolt iron, and, more especially, every variety of bolts, nuts, washers, lag screws, boiler and structural rivets, cap and set screws, railway track bolts, etc., and rods, plates, straps, and forgings for cars, bridges, buildings, etc.; annual capacity, 35,000 to 40,000 gross tons. Fuel, petroleum in the forging department and bituminous coal in the rolling mill department. Brand, "S." *See The Kansas City Bolt and Nut Company, Missouri.*

Reading Iron Company, Reading, Berks county. Rolling mill built in 1836; 8 single and 2 double puddling furnaces, 3 heating furnaces, 2 scrap furnaces, and 3 trains of rolls; product, grooved skelp iron; annual capacity, 10,000 gross tons. Sheet mill built in 1863; 10 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls; product, sheared skelp and plate iron; annual capacity, 18,000 gross tons. Oley Street Mills, built in 1896-7; 12 double puddling furnaces, 2 scrap furnaces, 2 gas heating furnaces, and 2 trains of 3-high rolls (one 20-inch puddle and one 23-inch skelp); product, skelp iron; annual capacity, 20,000 gross tons. Simon Seyfert, Superintendent of Rolling Mill Department. Also operates four tube mills for the production of wrought-iron pipe, boiler tubes, oil-well tubing and casing, and all tubular goods; annual capacity, 75,000 gross tons; W. B. Williams, Superintendent. Also a foundry and a machine shop for the production of all classes of rolling-mill and blast-furnace machinery, large castings, cotton compressors, sugar mills, and all other general machinery; George Schuhmann, Superintendent. Also a steam forge for the production of all classes of marine, engine, and general forgings; G. F. Dale, Superintendent. Officers of the company: George F. Baer, President; F. C. Smink, Treasurer and General Manager; T. O. Yarrington, Jr., Secretary. *See Reading Rolling Mill in Eastern Pennsylvania and Montour Rolling Mills in Central Pennsylvania. See Crumwold Furnace, Lehigh Valley, and Keystone Furnaces, Schuylkill Valley, Pennsylvania.*

Reading Rolling Mill, Reading Iron Company, Reading, Berks county. Built in 1868 and remodeled in 1889; 14 double puddling furnaces, 10 heating furnaces, 7 forge fires, and 4 trains of rolls (one 14 and three 23-inch); product, iron and steel structural shapes, including beams, channels, angles, tees, and bars; annual capacity, 45,000 gross tons. Fuel, anthracite and bituminous coal. Brand, "Reading."

Idle. *See Reading Iron Company in Eastern Pennsylvania and Montour Rolling Mills in Central Pennsylvania. See Crumwold Furnace, Lehigh Valley, and Keystone Furnaces, Schuylkill Valley, Pennsylvania.*

Schuylkill Haven Rolling Mill, Schuylkill Haven Iron Company, Schuylkill Haven, Schuylkill county. Put in operation October 1, 1873; 2 heating furnaces, 2 trains of rolls, (one 10 and one 16-inch,) and one railroad spike, bolt, and rivet machine; product, merchant bar iron, railroad spikes, bolts, and rivets; specialty, refined bar iron; annual capacity, 5,500 gross tons. Fuel, anthracite coal. L. W. Weissinger, President; W. I. Rahn, Secretary; James W. Ziebach, Treasurer and Manager.

Schuylkill Iron Works, Alan Wood Company, 519 Arch st., Philadelphia. Works at Conshohocken, Montgomery county. Built in 1858; 13 double puddling furnaces, 20 heating and 4 grate furnaces, 9 trains of rolls, (8 hot and one cold,) and one hammer; product, sheet and plate iron and steel; annual capacity, 20,000 gross tons. Fuel, anthracite and bituminous coal. Howard Wood, President; Jonathan R. Jones, Secretary and Treasurer.

Seyfert Rolling Mills, Samuel R. Seyfert & Brother, Reading, Berks county. Works at Seyfert Station, W. & N. R. R. Built in 1880-1 and started in March, 1881; 7 double puddling furnaces, 5 heating furnaces, one 4-ton hammer, one rotary squeezer, and three 22-inch trains of rolls; product, boiler-tube skelp, pipe skelp, and puddled bar; annual capacity, 15,000 gross tons of skelp iron and 9,000 tons of puddled bar. Fuel, bituminous coal. Brand, "Seyfert." For sale.

Slatington Rolling Mill, Slatington Rolling Mill Company, Slatington, Lehigh county. Built in 1890; 6 single puddling furnaces, one busheling furnace, 2 heating furnaces, and 3 trains of rolls (10, 16, and 20-inch); product, high-grade bar iron made from a special puddle mixture and by a patented process; annual capacity, 7,500 gross tons. Fuel, bituminous coal. Brands, "Slatington," "Slatington D. R.," "Slatington S. B.," "Slatington Special," and "Slatington Norway." Edward Edwards, President and Business Manager; S. DeLong, Secretary and Treasurer; William P. Hopkins, General Superintendent.

Thorndale Iron Works, Thorndale Iron Works Company, Thorndale P. O., Chester county. Telegraph address, Downingtown. Built in 1847; 4 double puddling furnaces, 2 heating furnaces, and one train of rolls; product, muck bar; annual capacity, 5,000 gross tons. Fuel, bituminous coal. Brand, "Thorndale." Charles L. Bailey, President, and Edward Bailey, Vice-President, Harrisburg; William L. Bailey, Treasurer and Manager, Malvern. Idle and for sale.

Thurlow Works, The American Steel Casting Company, principal office, Thurlow, Delaware county. Branch offices: Fisher Building, Chicago, and 23 Davis st., San Francisco. Built in 1883-4 and first put in operation in March, 1884; enlarged in 1890 and 1893; two 8-gross-ton

and two 20-gross-ton acid open-hearth steel furnaces; product, open-hearth steel castings; annual capacity, 10,000 gross tons. Fuel, coal. (Formerly operated by the Standard Steel Casting Company.) Daniel Eagan, President; W. M. Wilson, Vice-President; J. W. Booth, Secretary and Treasurer; S. A. Watson, General Sales Agent. *See Syracuse Works in New York, Norristown Works in Eastern Pennsylvania, Pittsburgh Works in Allegheny County, Sharon Works in Western Pennsylvania, and Alliance Works in Ohio, (Interior Counties District.)*

Tidewater Works, The Chester Pipe and Tube Company, lessee, 267 South Fourth st., Philadelphia. Works at Chester, Delaware county. Built in 1880; 10 heating furnaces and 3 trains of rolls (12, 20, and 23-inch); product, angles, bars, shapes, and grooved skelp; annual capacity, 50,000 gross tons. Fuel, bituminous coal. Brand, "Tidewater." (Formerly called the Tidewater Steel Works.) Francis L. Potts, President; William M. Potts, Vice-President; George E. Webb, Secretary and Treasurer; W. S. McManus, Superintendent. Owned by the Combination Steel and Iron Company.

Valley Iron Works, W. W. Kurtz & Sons, Coatesville, Chester county. Philadelphia office, Bullitt Building. Built in 1837 and rebuilt in 1888; 5 double puddling furnaces, 4 heating furnaces, and 4 trains of rolls (one 18 x 72-inch muck, and one 24 x 72-inch, one 30 x 96-inch, and one 30 x 110-inch plate); product, iron and steel boiler, bridge, ship, and tank plate; annual capacity, 10,000 gross tons. Fuel, bituminous coal. Idle and for sale.

Viaduct Iron Works, Coatesville Rolling Mill Company, Coatesville, Chester county. Built in 1838; 3 double puddling furnaces, 8 heating furnaces, 4 trains of rolls, and one hammer; product, boiler tube skelp and iron and steel plates and sheets; annual capacity, 15,000 gross tons. Fuel, coal. Adding a forge to contain 4 forge fires and one steam hammer; product, blooms for boiler tube iron. *See Brandywine Rolling Mills in Eastern Pennsylvania.*

Wellman Steel Works, Thurlow, Delaware county. Built in 1874-5; 5 gas heating furnaces, 1 hammer, and 2 trains of rolls (one 3-high mill with rolls 80 x 30 inches and one 3-high mill with rolls 72 x 25 inches); product, steel plates; annual capacity, 20,000 gross tons. Open-hearth steel plant, containing two 15-gross-ton acid open-hearth steel furnaces, added in 1881-2; two 20-gross-ton acid furnaces added in 1892; annual capacity, 30,000 gross tons of ingots, chiefly worked into plates. Bessemer steel plant, added in 1889, contains two 3-gross-ton converters and a blooming mill; daily capacity, 300 gross tons of ingots, worked into wire billets, slabs, and miscellaneous blooms. Brand, "Wellman." Owned by the second mortgage bondholders of the Wellman Steel Company, who are represented by Samuel A. Crozer, of Upland, Delaware county, Pa. Idle and for sale. *See Wellman Furnace, Schuylkill Valley, Pennsylvania.*

PROJECTED.

The Schuylkill Valley Steel Company contemplates erecting a plant near Birdsboro, Berks county, for the manufacture of high-grade open-hearth and crucible steel.

Number of rolling mills and steel works in Eastern Pennsylvania except Philadelphia: 52 completed and 1 projected. Of these 4 make Bessemer steel, 12 make open-hearth steel and 2 open-hearth steel plants are projected, 2 make crucible steel and 1 crucible steel plant is projected, and 2 make special steel.

CENTRAL PENNSYLVANIA.

Altoona Iron Company, Altoona, Blair county. First put in operation in April, 1873; 11 double and 6 single puddling furnaces, 4 heating furnaces, 4 trains of rolls, (two 8, one 16, and one 18-inch,) and one 3-ton hammer; product, refined bar, band, hoop, oval, half oval, half round, and scroll iron; annual capacity, 23,000 gross tons. Fuel, bituminous coal. Brand, "Altoona." John Fullerton, President; H. K. McCauley, Secretary and Treasurer; Robert Smiley, Manager of mill.

Bellefonte Iron and Nail Works, The Commonwealth Guarantee, Trust, and Safe Deposit Company, trustee, Harrisburg. Works at Bellefonte, Centre county. Built in 1881-2; put in operation March 1, 1882; 10 single and 2 double coal puddling furnaces, one double gas puddling furnace, 3 heating furnaces, 4 trains of rolls, (one 9 and one 15-inch bar, one 16-inch nail plate, and one 17-inch muck,) and 53 cut-nail machines; product, muck bar, bar iron, and nails and spikes; annual capacity, 4,500 gross tons of bar iron and 125,000 kegs of cut nails. Fuel, coal. Brand, "Bellefonte." For sale or lease.

Central Iron and Steel Company, Harrisburg, Dauphin county. (Formed by the consolidation on May 1, 1897, of the Central Iron Works, the Chesapeake Nail Works, and the Paxton Rolling Mills.) Three mills, two operated by the Central Iron and Steel Company and one leased to Charles L. Bailey & Co. (incorporated.) Central Iron Works, Harrisburg, Dauphin county: first mill built in 1853; new boiler plate mill built in 1878; new universal mill built in 1892; puddle mill contains one single and 7 double puddling furnaces; boiler plate mill contains one gas and 6 coal heating furnaces; entire works have 6 trains of rolls (one muck, one 25-inch and one 31-inch roughing, one Lauth 3-high 25-inch chilled finishing with rolls 72 inches long, one Lauth 3-high 31-inch chilled finishing with rolls 96 inches long, and one universal 48-inch train, complete, capable of making plates 42 inches wide); boiler plate mill has 2 large Morgan guillotine shears, one large circle shear for shearing boiler heads, and all other necessary machinery for rolling plates, sheared and universal, of almost any size and quality required; product, boil-

er plate and tank iron and boiler plate steel; annual capacity, 24,000 gross tons of boiler plates, 50,000 tons of universal plates, and 9,000 tons of muck bar; fuel, coal and manufactured gas. Paxton Rolling Mills, Harrisburg, Dauphin county. Old mill built in 1869; 7 double puddling furnaces, 5 coal heating furnaces, 3 trains of rolls, (one 22-inch puddle and one 30 x 72-inch and one 30 x 96-inch plate,) and one 3-ton hammer; new mill built in 1892-3; 3 gas heating furnaces and one train of 3-high rolls, 34 x 126 inches; product, plate iron and steel; annual capacity, 48,000 gross tons; fuel, producer gas. Brand, "Central." Officers of the company: Charles L. Bailey, President; James M. Cameron, Vice-President; S. B. Boude, Secretary; G. M. McCauley, Treasurer and General Manager.

Chesapeake Nail Works, Charles L. Bailey & Co., (incorporated,) lessees, Harrisburg, Dauphin county. Built in 1867; 18 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, (one 20-inch puddle and one 16-inch plate,) and 103 cut-nail machines; product, iron and steel nails and muck bar; annual capacity, 260,000 kegs of nails and 11,000 gross tons of muck bar. Fuel, coal. Brand, "Chesapeake." Charles L. Bailey, President; Edward Bailey, Vice-President; John C. Harvey, Secretary and Treasurer; James B. Bailey, General Manager. Owned by the Central Iron and Steel Company.

Columbia Iron Company, Columbia, Lancaster county. First put in operation July 13, 1886; 9 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 3-high 18-inch puddle, one 2-high 18-inch bar, and one 3-high 9-inch guide); product, bar iron, socket, oval, etc.; annual capacity, 14,000 gross tons. Fuel, coal. Brand, "C. I. C." C. C. Kauffman, President and General Manager; J. W. Yocum, Secretary and Treasurer. Selling agent, S. K. Wilmurt, 29 Broadway, New York.

Columbia Rolling Mill Company, Columbia, Lancaster county. Built in 1854 and remodeled and enlarged in 1885; 12 double puddling furnaces, 4 heating furnaces, and 4 trains of rolls; product, skelp and tube iron; annual capacity, 20,000 gross tons. Fuel, bituminous coal. Brand, "Columbia." John Q. Denney, President and General Manager; John W. Steacy, Secretary and Treasurer. *See Vesta Furnace, Lower Susquehanna Valley, Pennsylvania.*

Danville Nail Works, C. R. Baird & Co., Bullitt Building, Philadelphia. Works at Danville, Montour county. Built in 1883 and first nails made August 31, 1883; 3 double puddling furnaces, 2 large heating furnaces, 2 trains of rolls, (18-inch puddle and 3-high 20-inch plate,) and 92 cut-nail machines; product, muck bar and iron and steel nails; annual capacity, 250,000 kegs of cut nails. Idle and for sale or lease.

Duncannon Iron Works, The Duncannon Iron Company, Duncannon, Perry county. Office, 122 Race st., Philadelphia. Built in 1836; 20

single puddling furnaces, 7 heating furnaces, 4 trains of rolls, (one 8, one 16, and two 20-inch,) and 50 cut-nail machines; product, bar iron and iron and steel nails; annual capacity, 10,000 gross tons of bar iron and 125,000 kegs of nails. Fuel, bituminous coal. Brand, "Duncannon." John Wister, President and Treasurer; William E. S. Baker, Secretary and Assistant Treasurer.

East Lebanon Iron Company, Lebanon, Lebanon county. Built in 1891, destroyed by fire in 1893, and rebuilt and put in operation the same year; 8 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls (20-inch muck, 10-inch guide, and 18-inch bar); product, muck bar and merchant bar iron; annual capacity, 20,000 gross tons of muck bar and 24,000 tons of bar iron. Fuel, bituminous coal. Brand, "Avon." H. H. Light, President and Manager; H. O. Nutting, Secretary; William P. Nutting, Treasurer.

Green Ridge Iron Works, Susan Spencer, Scranton, Lackawanna county. Built at Providence, Pa., in 1876; removed to Green Ridge, Scranton, in 1879; enlarged in 1887; 2 heating furnaces, 3 spike machines, and 2 trains of rolls (10 and 12-inch); product, bar iron, mine-car axles, strap rails, railroad spikes, toe-calk steel, light forgings, and general machine work; annual capacity, single turn, 5,500 gross tons. Fuel, anthracite coal. Brand, "Green Ridge Iron Works." Will add a drop forging department. F. E. Spencer, Manager; W. B. Cobb, Foreman. Selling agents, P. W. Brown, 33 Wall st., New York; H. Culkin, Scranton.

Harrisburg Nail Works, Harrisburg, Dauphin county. Works at Fairview, Cumberland county, on the Northern Central Railway. Built in 1810; 9 double puddling furnaces, 4 heating furnaces, and one train of muck rolls; steam and water power; product, muck bar; annual capacity, 18,000 gross tons. Fuel, bituminous coal. V. C. McCormick, Treasurer. Owned by The Paxton Iron and Steel Company. *See Paxton Furnaces, Lower Susquehanna Valley, Pennsylvania.*

Harrisburg Rolling Mill Company, Harrisburg, Dauphin county. Original works built in 1865 to roll rails; 2 single and 12 double puddling furnaces, 10 heating furnaces, and 4 trains of rolls (one 9, one 16, and two 19-inch); product, skelp iron; annual capacity, 24,000 gross tons. Fuel, coal. (Formerly called Lochiel Iron and Steel Works.) R. C. Neal, President and Treasurer; John Y. Boyd, Vice-President; J. W. Covert, Secretary. Selling agents, Charles K. Barns & Co., Fourth and Chestnut sts., Philadelphia.

Hollidaysburg Iron Works, Hollidaysburg Iron and Nail Company, Hollidaysburg, Blair county. Built in 1860; one double and 7 single puddling furnaces, 2 heating furnaces, 4 trains of rolls, (one 8, one 16, and two 18-inch,) and 23 cut-nail machines; product, merchant bar, channel, skelp, and hoop iron, flat and small T rails, and cut nails and spikes; annual capacity, single turn, 5,000 gross

- tons of bar iron and 60,000 kegs of cut nails. Fuel, bituminous coal. Brand, for bar iron, "I. X. L." J. D. Hemphill, President; J. W. Bracken, Treasurer and General Manager; T. F. Johnston, Secretary. Howard Rolling Mills, Jenkins Iron and Tool Company, lessee, Bellefonte. Works at Howard, Centre county. Built in 1840; 3 double and 2 single puddling furnaces, 2 heating furnaces, and 2 trains of rolls (12 and 16-inch); steam and water power; product, bar iron consumed by the company in the production of hardware specialties; annual capacity, 5,500 gross tons. Fuel, bituminous coal. Brand, "Howard." A. J. Deitrich, President; James T. Armstrong, Vice-President; F. S. Chapin, Secretary and Treasurer; W. R. Jenkins, Manager. Owned by Jenkins, Brothers & Lingle.
- Jackson and Woodin (The) Manufacturing Company, Berwick, Columbia county. New York office, 47 Cedar st. Built in 1872; 1 single and 9 double puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 12 and two 3-high 18-inch); product, merchant bar iron; annual capacity, 22,000 gross tons. Fuel, bituminous coal. Brand, "Berwick." Also builds cars and manufactures car-wheels, forgings, and cast-iron gas and water pipe. Frederick H. Eaton, President; W. H. Woodin, Vice-President; William F. Lowry, Secretary; William M. Hager, Treasurer; H. F. Glenn, General Manager.
- Janson Iron Company, Columbia, Lancaster county. Built in 1893-4 and first put in operation in September, 1894; 3 heating furnaces, 2 double puddling furnaces, 1 rotary squeezer, and 2 trains of rolls (one 12 and one 18-inch); product, merchant bar iron and steel; annual capacity, 8,000 gross tons. Fuel, bituminous coal. Joseph Janson, President; Valentine Janson, Secretary and Treasurer; Frank Janson, Manager.
- Juniata Rolling Mill, Hollidaysburg, Blair county. Built and put in operation in 1866; 13 single puddling furnaces, 2 heating furnaces, rotary squeezer, 2 trains of rolls, (10 and 18-inch,) and 30 cut-nail machines; product, merchant bar iron, rounds, squares, hexagons and socket iron, grooved skelp iron, and cut nails and spikes; annual capacity, 10,000 gross tons of puddled iron, 9,000 tons of bar and skelp iron, and 150,000 kegs of cut nails. (Formerly operated by The Eleanor Iron Company.) Owned by the first mortgage bondholders of the Hollidaysburg and Gap Iron Works, who are represented by Thomas J. Baldrige, of Hollidaysburg. For sale or lease.
- Lackawanna Iron and Steel Company, Scranton, Lackawanna county. New York office, 52 Wall st. Two works: North Works, (formerly operated by the Lackawanna Iron and Coal Company,) commenced in 1840; 33 heating furnaces and 10 trains of rolls, (one 12, two 18, two 20, three 23½, and two 36-inch,) and 2 hammers; product, light and heavy railroad steel rails, blooms, billets, angle bars, and merchant bars; annual capacity, 230,000 gross tons of steel rails, blooms,

billets, angle bars, and merchant bars. Bessemer steel plant added in 1875; three 7-gross-ton converters, 6 pig-melting and 3 spiegel-melting cupolas; first blow made October 23, 1875; first rail rolled December 29, 1875; product, ingots for rails, billets, etc.; annual capacity in ingots, 260,000 gross tons. South Works, (formerly operated by the Scranton Steel Company,) built in 1881-3; two 9-gross-ton Bessemer steel converters, 9 pig-melting and 3 spiegel-melting cupolas; first blow made March 29, 1883, and first steel rail rolled May 4, 1883; eight 6-ingot soaking pits, 3 trains of 32-inch rolls, and 2 small blooming trains, one pass each; product, steel rails; annual capacity, 360,000 gross tons of ingots and 320,000 tons of rails. Cupolas are to be improved and ingots are to be cast in moulds on cars. Both works use anthracite culm under boilers for fuel. Brand, "Lackawanna." Walter Scranton, President, and J. P. Higginson, Secretary and Treasurer, New York; A. Williams, Assistant Secretary, and Henry Wehrum, General Manager, Scranton. *See Lackawanna Furnaces, Upper Susquehanna Valley, and Lackawanna Iron and Steel Company, Lower Susquehanna Valley, Pennsylvania.*

Lalance and Grosjean Manufacturing Company, Harrisburg, Dauphin county. Main office, 19 Cliff st., New York; branch offices, Boston and Chicago. Built in 1892-3 and first put in operation February 22, 1893; 4 forge fires, (2 run-out and 2 double hollow,) 10 heating furnaces, 1 sheet and 4 hot black plate mills, 3 cold mills, and one 5,000-lb. hammer; product, sheet iron and sheet steel and black plates for tinning; annual capacity, 2,500 gross tons of sheets and 5,500 tons of black plates. Brand, "L. & G." Contemplates erecting another hot black plate mill. F. Grosjean, President; Aug. J. Cordier, Vice-President; James Cochran, Secretary; E. W. Martin, Treasurer; E. Stanford, Manager. *See Tinplate Works in Pennsylvania.*

Lebanon Iron Company, Lebanon, Lebanon county. Built in 1882-3; 7 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (20-inch puddle and 8-inch and 12-inch finishing); product, muck bar and refined iron; annual capacity, 15,000 gross tons of refined iron. Fuel, bituminous coal. Brands, "Titan," "Titan B," and "Titan B. B." J. M. Shenk, President; A. Hess, Secretary and Treasurer; Thomas Evans, Superintendent; H. T. Hecht, Assistant Superintendent.

Lebanon Rolling Mills, Lebanon Rolling Mill Company, Lebanon, Lebanon county. Built in 1867; 10 double puddling furnaces, 9 heating furnaces, 7 trains of rolls, and one hammer; product, boiler plates, sheets, skelp, merchant bar, washers, and muck bar; annual capacity, 20,000 gross tons of plates and skelp iron. A forge was added to the works in 1885-6; it has 6 fires and one hammer; product, charcoal scrap blooms, all consumed in the works; weekly capacity, 80 gross tons. Fuel, bituminous coal. Samuel E. Light, President.

Lewisburg Rolling Mill, Lewisburg, Union county. Built in 1884 and first put in operation November 10, 1884; 5 double puddling furnaces, one heating furnace, one 18-inch train of rolls, and 41 cut-nail machines; annual capacity, 125,000 kegs of cut nails. Fuel, coal. Owned by James B. Bailey, Harrisburg, and Joshua B. Lessig, Pottstown. Idle and for sale or lease.

Lickdale Iron Works, Lickdale, Lebanon county. Built in 1886-7 and put in operation September 5, 1887; two 3-gross-ton Bessemer steel converters and one 24-inch blooming mill; product, soft steel billets for boiler, tank, shovel, nail plate, and miscellaneous purposes; annual capacity, 20,000 gross tons. Fuel, coke and anthracite coal. Samuel Weiss, Lebanon, executor of John H. Lick, owner. Idle for several years and for sale or lease.

Logan Iron and Steel Works, Logan Iron and Steel Company, Burnham, Mifflin county, 4 miles from Lewistown, on the M. & C. C. R. R. Philadelphia office, Harrison Building, southwest corner Fifteenth and Market sts. Started in 1869, partly destroyed by fire in 1894, and rebuilt in the same year; one single and 10 double puddling furnaces, 6 heating furnaces, 4 hammers, (one a heavy blooming hammer for Norway and horseshoe iron and hammered charcoal bars,) and 5 trains of rolls (one 8, one 12, one 16, and two 18-inch); one 100,000-lb. and one 300,000-lb. testing machine for testing all kinds of iron, coupling links, chains, etc.; steam and water power; product, charcoal and refined bar iron, staybolt, crown bar, bridge iron, angles, bent truck sides, coupling links and pins, switch iron, skelp, and drill rods to 6 inches in diameter; annual capacity, 24,000 gross tons of rolled iron. A chain works is partly erected; work suspended. Fuel, bituminous coal. Brands, "Logan," "Logan Staybolt," and "Logan Refined." H. T. Townsend, President, R. F. Kennedy, Treasurer, and S. H. Pitcher, Secretary, Philadelphia; R. H. Lee, Superintendent, Lewistown. *See Emma Furnace, Juniata Valley, and Greenwood (charcoal) Furnace, in Pennsylvania.*

Mahoning Rolling Mill, Howe & Polk, lessees, Danville, Montour county. Built in 1847 and rebuilt since; 10 double puddling furnaces, 6 heating furnaces, and 3 trains of rolls (two 16-inch skelp, fitted with automatic tables, and one 19-inch puddle and breaking-down train); product, skelp iron; annual capacity, 27,000 gross tons. Fuel, coal. The works are now producing structural tubing, covered by patents, consisting of round unwelded tubing from $\frac{1}{2}$ inch to 3 inches in diameter; also angles, channels, odd shapes, and small zee bar mouldings; annual capacity, 10,000 gross tons; R. K. Polk, General Manager. Selling agent, National Structural Tubing Company, 173 Broadway, New York.

Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Built in 1830; 3 single puddling furnaces, 2 heating furnaces, 3

trains of rolls, and 2 hammers; steam and water power; product, all sizes of bar iron; also soft wire rods for wire, flat and round head screws, and best grade of carriage bolts; annual capacity of bar mill, 2,250 gross tons; of rod mill, 1,350 tons. Fuel, bituminous coal. Also operate a wire-drawing plant; also a factory for the manufacture of all kinds of polished and cable chains. *See Hecla (charcoal) Furnace in Pennsylvania. See Bloomaries in Pennsylvania.*

Milton (The) Manufacturing Company, (incorporated,) Milton, Northumberland county. (Successor to Milton Manufacturing Company.) Built in 1886-7 and first put in operation in February, 1889; fitted with machinery for making wrought-iron washers cut from new plates rolled expressly for the purpose; 4 double puddling furnaces, 4 heating furnaces, 2 heavy steam forge hammers, 2 trains of rolls, (one muck and one 10-inch guide,) and automatic washer-cutting machines; also a bolt and nut factory, in which oil is used for fuel in the heating furnaces; product, muck bar, forgings, bar iron, washers, and bolts and nuts; annual capacity of rolled iron, 5,000 gross tons. Fuel used in rolling mill department, bituminous coal. Also operates foundry and machine shops. S. J. Shimer, President; E. S. Shimer, Secretary and Treasurer; G. S. Shimer, Superintendent.

Milton Nail Works, F. A. Godcharles Company, Milton, Northumberland county. Built in 1875 and enlarged in 1889; 4 single and 9 double puddling furnaces, 3 heating furnaces, rotary squeezer, one 3-high puddle and one 20-inch finishing train of rolls, and 89 cut-nail machines; product, 3, 4, and 5-inch muck bar and iron and steel cut nails and spikes; annual capacity, 15,000 gross tons of muck bar and 200,000 kegs of nails and spikes. Fuel, coal. Brands for nails, "Fuller Mills" and "Godcharles." C. A. Godcharles, Manager. Selling agents, Fuller Brothers & Co., 139 Greenwich st., New York.

Milton Rolling Mill and Forge, The Milton Iron Company, Milton, Northumberland county. Put in operation December 1, 1872; 5 single and 3 double puddling furnaces, 4 coal and one gas heating furnace, rotary squeezer, 5 trains of rolls, (8, 10, 15, 18, and 20-inch,) 2 hammers, and other machinery for the production of car axles and iron and steel forgings; product, merchant bar iron, car axles, and forgings; annual capacity, 12,000 gross tons of bar iron, 3,500 tons of forgings, and 7,500 axles. Fuel, bituminous coal. Brand, "Milton." W. A. Schreyer, President; John M. Young, Treasurer; J. Y. Schreyer, Secretary; John Jenkins, General Manager.

Montour Rolling Mills, Reading Iron Company, Reading. Works at Danville, Montour county. Built in 1845; 20 double puddling furnaces, 11 heating furnaces, 5 trains of rolls, (one 12, one 16, and three 20-inch,) and one 5-ton hammer; product, iron and steel rails, bar iron, angle iron, splice bars, and grooved skelp iron; annual capacity, 36,000 gross tons. Fuel, anthracite and bituminous coal.

Theo. F. Patterson, Superintendent. *See Reading Iron Company and Reading Rolling Mill in Eastern Pennsylvania. See Crumwold Furnace, Lehigh Valley, and Keystone Furnaces, Schuylkill Valley, Pennsylvania.*

North Branch Steel Works, The North Branch Steel Company, Danville, Montour county. Philadelphia office, Twenty-fifth st. and Washington ave. Mill formerly known as the Co-operative Iron and Steel Works; established in 1871; open-hearth steel plant added in 1882-3 and first steel made February 15, 1883; one 10-gross-ton acid open-hearth steel furnace; annual capacity, 11,000 gross tons. Bessemer steel works built in 1887-8; two 4-gross-ton converters, never put in operation, 2 Hainsworth soaking pits, and one 32-inch reversing blooming train; annual capacity, 120,000 gross tons of ingots. Rolling mill contains 6 coal and 2 gas heating furnaces and 2 trains of rolls, (22-inch shape and rail and 28 x 84-inch plate.) Product, steel boiler, ship, and tank plates, light and heavy T and street rails, blooms, slabs, shapes, machinery and agricultural steel, and sheared skelp iron; annual capacity, 75,000 gross tons of rails and shapes and 11,000 gross tons of plates and skelp iron. Fuel, manufactured gas and bituminous coal. F. P. Howe, President; Walter S. Massey, Vice-President; William Selfridge, Treasurer; Charles M. Griffith, Secretary; R. K. Polk, General Manager. Selling agents, William Wharton, Jr., & Co., Incorporated, Twenty-fifth st. and Washington ave., Philadelphia. *See North Branch Furnace, Upper Susquehanna Valley, Pennsylvania.*

Northumberland Iron and Nail Works, Van Alen & Co., Northumberland, Northumberland county. Built in 1883 and first put in operation in January, 1884; 9 double puddling furnaces, 2 heating furnaces, 2 trains of rolls, (one 18-inch muck and one 20-inch plate,) and 94 cut-nail machines; product, iron and steel nails and muck bar; annual capacity, 250,000 kegs of cut nails on single turn and 12,000 gross tons of muck bar on double turn. Fuel, bituminous coal. Brand, "Van Alen & Co." Formerly operated by Taggarts & Howell. (Works built in 1867 partly destroyed by fire on December 29, 1894; dismantled in 1896.)

Penn Iron Works, Penn Iron Company Limited, Lancaster, Lancaster county. First put in operation in April, 1873; 7 double puddling furnaces, 4 heating furnaces, 4 trains of rolls, (18-inch puddle, 8 and 10-inch guide, and 16-inch bar,) and 2 hammers; product, merchant bar iron, hammered and rolled axles, car forgings, bridge work, fish joints, bolts, railroad, ship, and wharf spikes, bolt ends, etc.; annual capacity, 15,000 gross tons of rolled products. Fuel, bituminous coal. Brand, "Penn." A. J. Steinman, Chairman; C. S. Foltz, Secretary and Treasurer.

Pennsylvania Bolt and Nut Company, Lebanon, Lebanon county. First put in operation in January, 1883; burned and rebuilt in 1886; 10

double puddling furnaces, one gas and 6 coal heating furnaces, and 6 trains of rolls (one 20-inch puddle, and one 8, one 10, two 12, and one 16-inch finishing); product, bar iron and steel, car forgings, bolts, nuts, washers, etc.; annual capacity, 50,000 gross tons. Fuel, manufactured gas and bituminous coal. Brands, "P." and "P. B. & N. Co." Arthur Brock, President; Horace Brock, Vice-President; James Lord, Secretary and Treasurer.

Pennsylvania Steel Works, The Pennsylvania Steel Company, Steelton, Dauphin county. Office, 312-19 Girard Building, Broad and Chestnut streets, Philadelphia; New York office, 2 Wall street; Boston office, 70 Kilby street; Baltimore office, Equitable Building; Chicago office, 413 Western Union Building; London office, 36 Lime street. Bessemer steel works built in 1865-7; three 10-gross-ton converters; first blow made in June, 1867; annual capacity, 300,000 gross tons of ingots, worked into blooms and slabs for structural purposes, plates, nail slabs, rails of all sections, street rails, crossings, frogs, switches, steel castings, and merchant steels generally. Rail mill built in 1867-8; blooming mill added to rail mill in 1875-6 and put in operation in December, 1876; annual capacity, 180,000 gross tons of rails. No. 2 blooming mill, reversing, built in 1885-6 and put in operation in 1886. Hammer mill contains 4, 6, and 12-ton hammers. Open-hearth steel plant, containing two 15-gross-ton furnaces, erected in 1875; furnaces removed in 1883 and two 30-ton furnaces erected; one 5-ton furnace added in 1889, two 15-ton furnaces added in 1890, one 7-ton furnace added in 1892, and six 50-ton furnaces added in 1893, three being put in operation in that year; produces both acid and basic open-hearth steel; plant now contains two 20 and four 50-gross-ton basic furnaces and two 6, two 25, and two 50-gross-ton acid furnaces; annual capacity, 200,000 gross tons of ingots, worked into boiler, structural, and special steels. Merchant mill, erected in 1883, contains one 13 and one 20-inch train of rolls; billet mill, erected in 1887, contains one 20-inch train; slabbing mill, erected in 1893, contains one set of housings and includes two horizontal rolls 26 inches in diameter and two vertical rolls 20 inches in diameter. There are also machine shops and the necessary repair shops connected with the works. Fuel, coal and manufactured gas. Luther S. Bent, Chairman of Executive Committee, E. C. Felton, President, E. F. Barker, Secretary, and Edmund N. Smith, Treasurer, Philadelphia; H. F. Martin, Assistant to President, H. H. Campbell, Superintendent, and Frank Tenney, Assistant Superintendent, Steelton. Selling agents, Richard Peters, Jr., Philadelphia; S. W. Baldwin, New York; Charles S. Clark, Boston; R. C. Hoffman & Co., Baltimore; The Q. & C. Company, Western Union Building, Chicago; C. B. Kaufman & Co., San Francisco. *See Furnaces in the Lower Susquehanna Valley, Pennsylvania.*

Portage Iron Company Limited, Duncansville, Blair county. New York office, A. R. Whitney & Co., 29 Broadway. Built in 1839 and rebuilt in 1882-3; enlarged in 1890 and 1897; 37 single puddling furnaces, 3 coal and 3 gas heating furnaces, 7 trains of rolls, (18 and 20-inch muck, 15-inch bar, 7 and 10-inch hoop, 8-inch guide, and one double 8-inch rod,) and 103 wire-nail machines; product, iron and steel bars, bands, angles, hoops, cotton-ties, wire rods, and wire nails; annual capacity, double turn, 30,000 gross tons of steel hoops and cotton-ties, 15,000 tons of bar and guide iron, 30,000 tons of wire rods, and 500,000 kegs of wire nails. Fuel, producer gas and coal. Brand, "Portage." A. R. Whitney, President, J. P. Meday, Vice-President, R. K. Hance, Secretary, and A. R. Whitney, Jr., Treasurer, New York; W. G. Merriman, General Manager, Duncansville.

Standard (The) Steel Works, Harrison Building, Philadelphia. Works at Burnham, Mifflin county. Built in 1869; 16 heating furnaces, 6 hammers, (two 10-ton and one 15-ton Tannet & Walker, one 7-ton Sellers, one 30-cwt. Morris, and one 25-cwt. Sellers,) and 2 tire mills; product, steel locomotive and car tires, forgings, wrought-iron wheel centres, and wheels; specialties, locomotive and car-wheel tires and steel-tired wheels; annual capacity, 15,000 gross tons of steel tires and 1,500 tons of forged wrought-iron wheel centres. Steel department, added in 1895, contains two 12-gross-ton Wellman revolving acid open-hearth steel furnaces; first steel made March 18, 1895; product, ingots and castings; annual capacity, 15,000 gross tons. Fuel, bituminous coal and producer gas. Brand, the word "Standard" between two anchors. William Burnham, President and Treasurer; Merle Middleton, Vice-President; Theodore J. Lewis, Secretary; J. P. Stevenson, Superintendent; A. A. Stevenson, Mechanical Engineer. Selling agents, Charles Riddell, 1217 Monadnock Block, Chicago; C. A. Thompson, 615 North Fourth st., St. Louis; W. E. Clark, 8 Oliver st., Boston; T. L. Courtney, Jr., Richmond, Va.

Sunbury Iron Works, Sunbury, Northumberland county. Built in 1883 and first put in operation in August, 1883; 2 single and 4 double puddling furnaces, 1 heating furnace, 2 trains of rolls, and 41 cut-nail machines; annual capacity, 120,000 kegs of cut nails. Fuel, semi-bituminous coal. Brand, "Sunbury." (Formerly called Sunbury Nail Works.) William M. Gordon, President; Newton R. Turner, Secretary and Treasurer.

Susquehanna Iron Works, Susquehanna Iron Company, Columbia, Lancaster county. Built in 1860, partly destroyed by fire in 1895, and rebuilt in the same year; 13 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls; product, merchant bar iron; annual capacity, 10,500 gross tons. Fuel, bituminous coal. William Patton, President and General Manager; H. F. Bruner, Vice-President; J. E. Schall, Secretary and Treasurer.

Tyrone Forges, The Tyrone Iron Company, Tyrone, Blair county. Office, Harrisburg. Forges established in 1809; rebuilt in 1870; rolling mill added in 1883; 3 regenerative gas heating furnaces and one 16-inch train of rolls; product, charcoal boiler-tube skelp; annual capacity, 11,000 gross tons. Fuel, producer gas. Forges have 8 fires, one double run-out, and one hammer; the blast is operated by water-power and the hammer by steam-power; product, charcoal blooms, all consumed in the rolling mill; annual capacity, 6,000 gross tons. John Y. Boyd, President, and R. C. Neal, Secretary and Treasurer, Harrisburg; H. L. Sholly, Superintendent, Tyrone. Sales made by the company.

Valentine (The) Iron Company, Bellefonte, Centre county. Built in 1798; 4 double puddling furnaces and one train of 18-inch rolls; water-power; product, muck bar; annual capacity, 4,000 gross tons. Fuel, bituminous coal. Brand, "Nittany." John P. Harris, President; Robert Valentine, Secretary and Treasurer. *See Furnaces in the Juniata Valley, Pennsylvania.*

Watsonstown Nail Works, D. C. Kaseman & Co., Watsonstown, Northumberland county. Built in 1886-7 and put in operation in May, 1887; 3 double puddling furnaces, one heating furnace, one forge fire, 2 trains of rolls, (one 4-inch muck and one 12-inch plate,) and 47 cut-nail machines; product, muck bar and iron and steel nails; annual capacity, single turn, 70,000 kegs of cut nails. Fuel, bituminous coal. Brands, "Watsonstown" and "Fuller's Mills." Selling agents, Fuller Brothers & Co., 139 Greenwich st., New York.

West End Rolling Mill Company and Chain Works, Lebanon, Lebanon county. Built in 1872-4; 2 single and 2 double puddling furnaces, 2 heating furnaces, 3 trains of rolls, and one hammer; product, bar and horseshoe iron, skelp, chains, and car links; annual capacity, 5,000 gross tons of rolled products. Fuel, bituminous coal. Chain works erected in 1884. J. Henry Miller, President; H. M. Capp, Secretary and Treasurer; John R. Evans, Superintendent of Rolling Mill.

Williamsport Iron and Nail Works, Williamsport Iron and Nail Company, Williamsport, Lycoming county. Built in 1873-4; 5 double puddling furnaces, one coal and one Smith gas heating furnace, 2 trains of rolls, (17 and 18-inch,) and 80 cut-nail machines; product, iron and steel nails and muck bar; annual capacity, 150,000 kegs of nails and 3,600 gross tons of muck bar. Fuel, coal and manufactured gas. Brand, Williamsport Iron and Nail Co. "Nails." C. LaRue Munson, President; John M. Young, Treasurer; J. Y. Schreyer, Secretary; John Jenkins, General Manager. Selling agents, E. L. Hand & Co., 616 Market st., Philadelphia; J. T. Armstrong & Co., 361 North st., Baltimore.

York Rolling Mill, Steacy and Denney Company, York, York county.

Built in 1869; 8 double puddling furnaces, 4 heating furnaces, 3 trains of rolls, (one 18, one 22, and one 26-inch,) and 2 hammers; product, plate and skelp iron; annual capacity, 10,000 gross tons. Fuel, bituminous coal. Brand, "York Rolling Mill." John Q. Denney, President; J. W. Steacy, Secretary, Treasurer, and General Manager. *See Aurora Furnace, Lower Susquehanna Valley, Pennsylvania.*

Number of rolling mills and steel works in Central Pennsylvania: 47. Of these 5 make Bessemer steel and 3 make open-hearth steel.

PITTSBURGH AND ALLEGHENY COUNTY.

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Works in the Twenty-fourth and Twenty-fifth wards, South Side. Built in 1852; 40 heating furnaces, 20 trains of rolls, and 3 hammers. Bessemer steel works built in 1886; two 10-gross-ton converters; first blow made August 19, 1886; annual ingot capacity, 500,000 gross tons. Open-hearth steel department added in 1895 and enlarged in 1896; one 25-gross-ton acid and six 40-gross-ton basic furnaces; first steel made September 28, 1895; annual ingot capacity, 150,000 tons. Product, steel bars, rails, plates, sheets, structural shapes, steel billets, railroad splice bars and bolts, boat and railroad spikes, machine and bridge bolts, chains, railroad coupling links and pins, forgings, steel castings, cold-rolled shafting, finger bars, couplings, hangers, pillow blocks, and pulleys; annual capacity, 600,000 gross tons of steel billets and blooms and 300,000 tons of finished materials. Connected with the works are two foundries, (one iron and one steel,) a chain factory, a bolt factory, and machine shops. Annual capacity of the foundries, 17,500 gross tons of iron and 2,500 tons of steel castings; of the cold-rolling department, 25,000 tons of shafting and finger bars; of the chain factory, 10,000 tons of chain and railroad coupling links; of the bolt factory, 8,000 tons of bolts, spikes, and railroad coupling pins; and of the shops for fitting structural material, 24,000 tons. Machine shops are equipped with tools of modern design, and can produce pulleys and balance wheels up to 30 feet in diameter and handle masses weighing 50 tons. Fuel, natural gas, producer gas, and coal. Brand, "American." B. F. Jones, Chairman; G. M. Laughlin, Secretary and Treasurer; B. F. Jones, Jr., Manager.

Anchor Nail and Tack Works and Central Expanded Metal Company, Chess Brothers, 531 Wood st., Pittsburgh. Two mills: Works on Nineteenth st., South Side, built in 1842; 24 single puddling furnaces, 6 heating furnaces, 4 trains of rolls, 90 cut-nail machines, 76 tack machines, and 2 hammers; product, cut nails, tacks, shoe nails, etc.; annual capacity, 15,000 gross tons of rolled products and 200,000 kegs of cut nails; fuel, coal; rolling mill and nail machines idle. Works at Rankin Station, built in 1886 and enlarged in 1888; one gas heating furnace and one 3-high 24-inch plate train; product,

light steel plates for straps, nails, tacks, stamping, and die work; annual capacity, 12,000 gross tons of rolled products; 5 expanded metal machines for producing steel fire-proof lathing, fencing, screens, etc.; fuel, coal for steam and producer gas for heating and annealing.

Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh.

Decline to give information for the Directory concerning their works.

Byers (A. M.) & Co., (incorporated,) Pittsburgh. Works on Sixth st., South Side. Built in 1862-3; 25 single puddling furnaces, 5 heating furnaces, one scrap furnace, and 3 trains of rolls (one 21-inch muck, one 21-inch plate, and one 17-inch skelp); product, skelp iron, all consumed in the manufacture of pipe; annual capacity, 16,000 gross tons. Also operate a galvanizing department; also 2 pipe mills to make lap and butt-welded wrought-iron, gas, steam, and water pipe, oil-well tubing, casing, etc. Fuel, natural gas in finishing mills and coal in puddling furnaces.

Carbon Steel Works, Carbon Steel Company, Thirty-second st., Pittsburgh. Built in 1862 and rebuilt in 1888; 1 Siemens heating furnace, 2 direct air heating furnaces, 6 soaking pits, two 15 and six 30-gross-ton acid open-hearth steel furnaces built in 1888 and subsequent years, and 2 trains of rolls (36-inch universal and 124-inch plate); product, acid open-hearth steel ingots, universal rolled plates, and sheared plates; annual capacity, 100,000 gross tons of ingots and 60,000 tons of finished plates. Fuel, natural and producer gas except under boilers. C. M. Raymond, President; A. H. Keith, General Agent. Selling agents, W. M. Wilson, Havemeyer Building, New York; Nat. C. Dean, Fisher Building, Chicago; Charles L. Harris, Union Trust Building, St. Louis.

Carnegie (The) Steel Company, Limited, general offices, Carnegie Building, Pittsburgh. Five mills in Allegheny county: Edgar Thomson Steel Works, at Bessemer, two miles from Pittsburgh, on the Pennsylvania, the Baltimore and Ohio, the Pittsburgh and Lake Erie, the Pittsburgh, Bessemer, and Lake Erie, and the Union Railroads and the Monongahela river; built in 1874-5 by the Edgar Thomson Steel Company, Limited, and enlarged by Carnegie Brothers & Co., Limited, and The Carnegie Steel Company, Limited; first blow made August 25, 1875, and first steel rail rolled September 1, 1875; four 15-gross-ton Bessemer converters, 4 spiegel cupolas, (molten iron used, brought direct from the Edgar Thomson Furnaces in ladles,) 21 Siemens and 2 reverberatory heating furnaces, one 3-high 40-inch blooming mill, two 3-high rail trains, (one 23-inch and one 25-inch,) and hot saws and finishing machinery; iron and brass foundry; a forge connected with the works contains one 6-ton hammer and 2 heating furnaces; product, Bessemer steel rails and billets and iron and brass castings; annual capacity, 1,000,000 gross tons of in-

gots, 600,000 tons of rails or billets, and 50,000 tons of castings; fuel, natural gas. Duquesne Steel Works, at Duquesne, four miles from Pittsburgh, on the Pennsylvania and the Union Railroads and the Monongahela river; built in 1886-8 by the Allegheny Bessemer Steel Company and capacity increased in 1891-2 by Carnegie Brothers & Co., Limited; first blow made in February, 1889, and first steel rail rolled in March, 1889; two 10-gross-ton Bessemer converters, 16 soaking pits, and 4 trains of rolls (two 21-inch, one 26-inch, and one 28-inch); product, rails, billets, and splice bars; annual capacity, 450,000 gross tons of ingots and 400,000 tons of rolled products; fuel, natural gas. Homestead Steel Works, at Munhall, one mile from Pittsburgh, on the Pennsylvania, the Pittsburgh and Lake Erie, and the Union Railroads and the Monongahela river; Bessemer steel department built in 1880-1 by the Pittsburgh Bessemer Steel Company, Limited, and enlarged by Carnegie, Phipps & Co., Limited; first blow made March 19, 1881; first steel rail rolled August 9, 1881; open-hearth steel department built by Carnegie, Phipps & Co., Limited, and The Carnegie Steel Company, Limited; 7 furnaces completed in October, 1886, 1 in July, 1890, 8 in September, 1890, 4 in September, 1895, 5 in April, 1898, and 5 in May, 1898; two 10-gross-ton Bessemer steel converters, and one 12-gross-ton, six 25-gross-ton, eight 35-gross-ton, and fifteen 40-gross-ton basic open-hearth steel furnaces; one 28 and one 38-inch blooming mill, one 23-inch and one 33-inch train for structural shapes, one 10-inch mill, one 32-inch slabbing mill, one 40-inch cogging mill, one 35-inch beam mill, and one 119-inch plate mill; one 3,000-ton and one 10,000-ton hydraulic press; press shop for forging and machine shop for finishing armor plate; also a steel foundry; product, blooms, billets, structural shapes, bridge steel, girder rails, boiler plate, armor plate, ship plate, tank plate, and steel castings; annual capacity, 400,000 gross tons of Bessemer steel ingots, 850,000 tons of basic open-hearth steel ingots, and 1,000,000 tons of rolled products; finishing capacity of armor plate department, 10,000 gross tons per annum; fuel, natural gas. Upper Union Mills, at Thirty-third street, Pittsburgh, on the Allegheny Valley Railroad; built in 1863-4 by the Cyclops Iron Company; enlarged by Carnegie, Kloman & Co., Carnegie Brothers & Co., Limited, and Carnegie, Phipps & Co., Limited; 19 heating furnaces and 7 trains of rolls (one 8, one 12, one 18, and one 20-inch, and two plate and one skelp); product, structural steel, steel bars, and steel universal mill plates; annual capacity, 215,000 gross tons; fuel, natural gas and coal. Lower Union Mills, at Twenty-ninth street, Pittsburgh, on the Allegheny Valley Railroad; built in 1861-2 by Kloman & Phipps and enlarged by Wilson, Walker & Co., Limited, and by Carnegie, Phipps & Co., Limited; 28 heating furnaces, 4 trains of rolls, (one 9, one 12, one 15, and one 78-inch,) 18 forge fires, and 14

hammers (700 to 7,000 lbs.); product, universal mill plates, car forgings, bridge work, angles, axles, links, pins, and bar steel; annual capacity, 70,000 gross tons of rolled and 10,000 tons of forged products; fuel, natural gas and coal. General officers: Board of Managers: H. C. Frick, Chairman; C. M. Schwab, President; A. R. Peacock, First Vice-President; L. C. Phipps, Second Vice-President and Treasurer; F. T. F. Lovejoy, Secretary; Geo. H. Wightman, General Sales Agent; H. M. Curry; W. H. Singer; and D. M. Clemson. Chas. L. Taylor, H. J. Lindsay, and Millard Hunsiker, Assistants to President; A. M. Moreland, Assistant Secretary and Auditor; W. W. Blackburn, Assistant Treasurer; John Pontefract, Purchasing Agent; George Megrew, Assistant Purchasing Agent. Sales offices: Atlanta, Equitable Building; Boston, Telephone Building; Buffalo, German Insurance Building; Chicago, Marquette Building; Cincinnati, Neave Building; Cleveland, Perry-Payne Building; Denver, People's Bank Building; Detroit, Hammond Building; Minneapolis, Guaranty Loan Building; New York, Empire Building; Philadelphia, Harrison Building; St. Louis, Globe-Democrat Building; San Francisco, 258 Market street; Washington, National Safe Deposit Building; London, England, 47 Victoria street; Montreal, Canada, 3 Windsor Hotel. *See Furnaces in Allegheny County, Pennsylvania.*

Chartiers (The) Iron and Steel Company Limited, Iron Exchange, Wood and Water sts., Pittsburgh. Works at Carnegie, Allegheny county. Built in 1883-4 and put in operation August 13, 1884; 4 single puddling furnaces, 11 heating furnaces, 5 trains of rolls, (32, 38, and 48-inch hot and 32 and 50-inch cold,) and one 4-ton hammer; product, sheet iron and sheet steel; annual capacity, 6,000 gross tons. Fuel, natural gas except under boilers. Brand, "Chartiers." John Henry, Chairman; D. A. Carter, Secretary; J. L. Kirkpatrick, Treasurer.

Clinton Rolling Mill, Clinton Iron and Steel Company, 208 Wood st., Pittsburgh. New York office, 15 Cortlandt st. Mill on the South Side. Built in 1846; 7 double puddling furnaces, 19 single puddling furnaces, 3 heating furnaces, and 2 trains of rolls (one 18-inch muck and one 22-inch plate); product, plate iron; annual capacity, 15,000 gross tons. Fuel, natural gas and coal. James W. Friend, President; F. N. Hoffstot, Treasurer. *See Clinton Furnace, Allegheny County, Pennsylvania.*

Crescent Steel Works, Crescent Steel Company, 242-44 First ave., Pittsburgh. Works, Forty-ninth to Fifty-first sts. Built in 1865; 32 heating furnaces, 6 annealing furnaces, 9 trains of rolls, one 60-pot, two 36-pot, and two 24-pot crucible steel-melting furnaces, and 18 hammers; product, hammered and rolled bar steel, and cast, spring, and edge-tool steel; specialty, fine steel; annual capacity, 11,000 gross tons. Also have a drill-rod shop, a wire shop, and a shop for making

- coiled springs. Fuel, natural gas, coal, and coke. Brand, "Crescent." Reuben Miller, President; Julius Bieler, Secretary and Treasurer.
- Elba Iron Works Department, Oil Well Supply Company, Pittsburgh. Works, Second ave., twenty-third ward. Built in 1862; 30 single puddling furnaces, 6 heating furnaces, and 4 trains of rolls (one 8, one 10, one 18-inch, and one muck train); product, skelp iron and steel used at the company's tube works; annual capacity, 35,000 gross tons. Fuel, bituminous coal. John Eaton, President; K. Chickering, Vice-President; E. T. Howes, General Treasurer; Louis Brown, Treasurer; J. C. Palmer, Secretary.
- Etna Iron and Tube Works, Spang, Chalfant & Co., Pittsburgh. Office, 66-70 Sandusky st., Allegheny. Manufacturers of bar and skelp iron and wrought-iron welded tubes for gas, water, steam, and oil; also boiler tubes. Works at Etna, Allegheny county. Built in 1828; rolling mill department contains one double and 25 single puddling furnaces, 9 heating furnaces, 5 trains of rolls, (one 8, one 12, one 16-inch, one plate mill, and one muck train,) and 2 hammers; product, pipe iron; annual capacity, 25,000 gross tons. Tube works department contains 2 butt weld and 3 lap weld furnaces; annual capacity, 22,500 gross tons. This was the first mill to use natural gas exclusively; it still uses it in all departments. George A. Chalfant, Manager.
- Firth-Sterling Steel Company, Westinghouse Building, Pittsburgh. Works at Demmler, Allegheny county. Established in 1875; two 24-pot crucible steel-melting furnaces, 9 heating furnaces, 5 hammers, (800 lbs. to 5 tons,) and 2 trains of rolls (one 8 and one 12-inch); product, fine crucible tool steel and Wheeler-Sterling armor-piercing projectiles; sizes of projectiles made, 4-inch, 5-inch, 6-inch, 8-inch, 10-inch, 12-inch, and 13-inch; annual capacity of tool steel, 4,700 gross tons; of projectiles, twenty 10-inch per day or their equivalent in other sizes. Fuel, coal. Brand, "Sterling." (Formerly operated by the Sterling Steel Company.) Also operates a machine shop, containing lathes, boring mills, etc. C. Y. Wheeler, President; Lewis J. Firth, General Manager; C. W. Mackey, Vice-President; John S. Lyon, Secretary and Treasurer. Sole agents for the United States and Canada, Abbott, Wheelock & Co., Boston, New York, and Chicago.
- Fort Pitt Foundry, Mackintosh, Hemphill & Co., Pittsburgh. Works, foot of Twelfth st. Open-hearth steel works built in 1882 and started in August of that year; two 12-gross-ton acid furnaces; product, steel castings; annual capacity, 15,000 gross tons. Fuel, natural gas. (Two 20-gross-ton open-hearth steel furnaces abandoned.) James Hemphill, President; W. Wade, Secretary; Pennock Hart, Treasurer; N. A. Hemphill, Manager.
- Glendon Rolling Mill, Dilworth, Porter & Co. Limited, Pittsburgh. Works on the South Side. Built in 1857; 32 heating furnaces, 13 automatic and 21 hand spike machines, and 7 trains of rolls, (four

8, one 9, and two 16-inch,) 3 trains being continuous for spike steel and 2 for merchant steel; product, steel railroad and boat spikes, tie plates, and merchant steel; annual capacity, 45,000 gross tons of spikes and 21,000 tons of bar steel and tie plates. Fuel, natural gas and coal. Brands: for spikes, "Dilworth, Porter & Co.;" for merchant steel, "Glendon." Lawrence Dilworth, Chairman; Samuel T. Owens, Vice-Chairman; J. R. Dilworth, Secretary and Treasurer.

Howe, Brown & Co. Limited, Penn ave. and Seventeenth st., Pittsburgh. Established in 1859; 13 single puddling furnaces, 40 heating furnaces, 17 hammers with 22 furnaces, 6 smith-shop fires and one smith-shop steam hammer, one double and 4 single annealing furnaces, six 24-pot and two 30-pot crucible steel-melting furnaces, 11 trains of rolls, (one 9, one 10, one 12, three 16, three 18, one 22, and one 28-inch,) one rake-tooth factory with 12 bending machines and 12 heating furnaces, one machine shop with 8 lathes, planers, etc.; product, crucible cast steel in bars, sheets, rods, plates, and special forgings; annual capacity, 11,000 gross tons of ingots. The open-hearth steel department has one 30-gross-ton acid furnace, built in 1886, and one 20-gross-ton acid furnace, built in 1890, with an annual capacity of 20,000 gross tons of ingots; product, spring, plow, and machinery steel, and plates for boilers, hulls of vessels, etc.; annual capacity, 7,200 gross tons of plates, 3,600 tons of machinery steel, 1,800 tons of plow steel, and 1,800 tons of spring steel. Fuel, natural gas, manufactured gas, and coal. Brand, "Howe." James W. Brown, Chairman; W. R. Howe, Vice-Chairman; Geo. A. Howe, Secretary; T. H. Childs, Treasurer. Branch offices, 127 Oliver st., Boston, and 55-59 North Jefferson st., Chicago. Selling agents, The Bourne-Fuller Company, Cleveland; Sligo Iron Store Company, St. Louis; F. I. Stone, Atlanta; Todd-Donigan Iron Company, Louisville; Einwechter & Wyeth, Philadelphia; The Mining and Smelter Supply Company, Denver, Colorado.

Keystone Rolling Mill, Pittsburgh. Works, Second ave. near Morris st., Soho. Built in 1865; 36 single puddling furnaces, 7 heating furnaces, and 5 trains of rolls (two muck and one 9, one 16, and one 23-inch plate); product, skelp and bar iron and cotton-ties; annual capacity, 30,000 gross tons. Fuel, coal. Brand, "Keystone." Works owned by the Estate of James McCutcheon. For sale or lease. Address Lindsay & McCutcheon, Allegheny, Pa.

La Belle Steel Works, La Belle Steel Company, Pittsburgh. Works, Ridge ave. and Rebecca st., Allegheny. Built in 1863; two 25-ton and two 30-ton converting furnaces, 19 forge fires, 28 heating furnaces, 11 Swindell gas producers, one 36-pot and two 42-pot crucible steel-melting furnaces, 15 hammers, 6 trains of rolls, (one 9, one 10, one 14, one 16, one 20, and one 24-inch,) and two 15-gross-ton acid open-hearth steel furnaces, one built in 1886 and one built in 1887;

product, high-grade merchant steel of every description; also finished harrow disks, horse hay-rake teeth, springs, and vehicle axles of iron or steel; annual capacity, 14,500 gross tons of open-hearth steel ingots, 7,900 tons of crucible steel ingots, and 20,000 tons of finished products. Fuel, coal, natural gas, and manufactured gas. Brand, "La Belle." (Formerly operated under the name of Smith Brothers & Co.) Andrew D. Smith, President; Frank B. Smith, Secretary; Severn P. Ker, Assistant Secretary; Hugh D. Smith, Treasurer. Selling agents, Wetherell Brothers, 31 Oliver st., Boston, and 93 Liberty st., New York; Byron H. White, 68-70 South Canal st., Chicago; W. G. Blyth, 29 Melinda st., Toronto, Ontario, Canada; W. A. Chenoweth, Birmingham, Alabama.

Liggett Spring and Axle Company, Pittsburgh. Works, Spruce and Market sts., Allegheny. Built in 1865 and 1882; one 16-inch train of rolls, used to reroll iron and steel into shapes for the manufacture of axles; product, buggy and wagon axles. Fuel, natural gas and coal.

Linden Steel Works, Second ave., Pittsburgh. Open-hearth steel works, built in 1879, contain one 25-gross-ton and two 15-gross-ton acid open-hearth steel furnaces, 16 heating furnaces, one blooming mill, one 31 x 108-inch plate mill, one 18-inch bar mill, one 20-inch sheet mill, two 10-inch mills, 6 hammers, and cold-condensed-shafting machinery; product, open-hearth steel ingots, blooms, billets, and slabs, rounds, squares, and flats, boiler, tank, armor, and ship plates, sheets, tool, spring, tire, and agricultural steel, and cold-condensed shafting; unusual shapes a specialty; daily capacity, 105 gross tons. Fuel, natural gas, producer gas, coal, and oil. Brand, "Linden." Idle and for sale. Address Cephas Taylor, Agent, 204 Lewis Building, Pittsburgh.

McKeesport Iron Works, W. Dewees Wood Company, general offices and works, McKeesport, Allegheny county. Branch office, 313 Water st., Pittsburgh. Built in 1851; 14 forge fires, 12 single puddling furnaces, 2 refinery fires, 12 annealing furnaces, 31 heating furnaces, 19 trains of rolls, (2 bar and 17 sheet,) and 8 hammers; open-hearth steel department, built in 1889-90, contains two 15-gross-ton acid open-hearth steel furnaces; product, sheet iron and sheet steel, both black and planished; specialty, patent planished sheet iron; annual capacity, 24,000 gross tons of rolled and 6,000 tons of forged products. Fuel, natural gas, manufactured gas, and coal. Trade-mark, a Russian bear in the talons of an American eagle. W. Dewees Wood, President; Richard G. Wood, Vice-President; Alan W. Wood, Secretary and Treasurer; Thomas D. Wood, Superintendent.

Monongahela Iron and Steel Company, Pittsburgh. Post-office address, Box 215. Works at Hay's Station, Pittsburgh and Lake Erie Railroad and Pennsylvania Railroad, in Allegheny county. Built and put in operation in 1891; 19 single puddling furnaces, 1 heating furnace, and 2 trains of rolls (one 20-inch muck and one 10-inch fin-

ishing); product, fine grades of muck bar and merchant sizes of billets for special work; annual capacity, 10,000 gross tons. Fuel, coal. Robert A. Carter, President and Manager; H. L. Brunt, Secretary and Treasurer.

Monongahela Tin Plate Company, 921-23 Carnegie Building, Pittsburgh.

Works on South Fifteenth st. Built in 1894-5 and first put in operation February 14, 1895; 14 heating furnaces, 6 annealing furnaces, and fourteen 24 x 32-inch hot and ten 20 x 34-inch cold mills; product, sheet bars and black plates for tinning; annual capacity, 25,000 gross tons. Fuel, coal. Henry W. Oliver, President; Richard R. Quay, Vice-President and Treasurer; E. G. Applegate, Secretary; John C. Oliver, Manager. *See Tinplate Works in Pennsylvania.*

National Tube Works Company, McKeesport, Allegheny county. Rolling Mills Department comprises the National Rolling Mills, built from 1878 to 1893; the National Forge and Iron Works, (exclusively charcoal,) built in 1882-3 and rebuilt in 1896; and the Boston Iron and Steel Works, (Riverton,) built in 1891-2. Equivalent of 120 single puddling furnaces, 25 heating furnaces, 15 trains of rolls, 2 trains of slab rolls, 5 steam hammers, 20 charcoal knobbling fires, and 2 refinery fires; product, muck bar, refined charcoal metal, charcoal iron blooms and bars, Swedish bars, charcoal boiler tube irons, and pipe irons and steel; total annual capacity, 180,000 gross tons; fuel, coal and manufactured gas; brand, "National;" (one 18-gross-ton acid open-hearth steel furnace, built in 1886, abandoned in 1895;) Christian I. O'Connor, Manager of Rolling Mills Department. Bessemer Steel Department built in 1892-3; two 8-gross-ton converters, three 10-foot cupolas, three 5-hole soaking pits, and one 36-inch reversing blooming train of rolls; first blow made December 14, 1893; product, ingots, blooms, slabs, and billets; annual capacity, 225,000 gross tons; William B. Schiller, Manager, and Taylor Allderdice, Superintendent, Steel Department. Officers of the company: D. W. Hitchcock, President; A. F. Luke, Secretary and Treasurer; E. C. Converse, Vice-President and General Manager; Horace Crosby, Assistant General Manager. *See Rolling Mills in Allegheny County, (Republic Iron Works.) See Monongahela Furnaces, Allegheny County, Pennsylvania.*

Oliver and Snyder Steel Company, German National Bank Building, Pittsburgh. Works at Twenty-seventh and Smallman sts. Bessemer steel plant built in 1881 and remodeled in 1891; two 5-gross-ton converters; first blow made August 26, 1881; 2 heating furnaces and one train of 32-inch rolls; product, billets, blooms, and slabs, from 4 x 4 inches to 20 x 8 inches; annual capacity, 120,000 gross tons. Fuel, natural gas and coal. (Formerly operated by the Hainsworth Steel Company.) W. P. Snyder, President; George T. Oliver, Vice-President; George L. Brown, Secretary; James Collord, Treasurer; Henry

Oliver, Superintendent. See *Rosena Furnace, Shenango Valley, and Edith Furnace, Allegheny County, Pennsylvania.*

Oliver Iron and Steel Company, Pittsburgh. Mills and factories located Tenth to Fifteenth sts., South Side, Pittsburgh. Operations first began in 1863; 36 single puddling furnaces, 13 heating furnaces, 14 hammers, 8 trains of rolls, and one continuous combination mill; product, bar iron and steel, rounds, squares, angles, plates, small channels, and light rails; also produces wide sheets for skelp iron, tank, and structural work; part of the iron made is used in the production of finished track bolts, rivets, machine bolts, carriage bolts, coach screws, nuts, washers, hinges, wagon hardware, railway car forgings, railway track tools, telegraph and telephone supplies, etc.; annual capacity, 75,000 gross tons. Fuel, natural gas and bituminous coal. (Formerly called the Allegheny, Monongahela, and Birmingham Iron Works. Steel works, containing two 2-ton Clapp-Griffiths converters, built in 1884, abandoned and dismantled in 1896. The company's rolling mill at Wood's Run Station, in Allegheny City, has also been abandoned and dismantled.) James B. Oliver, President; A. R. Fraser, Treasurer; D. B. Oliver, General Manager.

Oliver Wire Company, 1001 Muriel st., Pittsburgh. Rod mill built in 1884 and first put in operation June 12, 1884; 2 continuous heating furnaces and 4 trains of rolls (two 9, one 12, and one 18-inch); product, wire rods; annual capacity, 90,000 gross tons. Wire department contains all necessary machinery for the manufacture of plain and barbed wire and wire nails; number of wire-nail machines, 234; annual capacity, 100,000 gross tons of drawn wire, 31,500 tons of barbed wire and fencing specialties, and 960,000 kegs of wire nails. Fuel, natural gas and coal. Brand, "Oliver." (Formerly called the Oliver and Roberts Wire Company.) George T. Oliver, President; Stephen W. Tener, Vice-President; Henry B. Lupton, Secretary; William H. Cassidy, Treasurer; James H. Fraser, Assistant Secretary; Cadwalader Evans, General Superintendent. Selling agents, Fuller Brothers & Co., New York.

Pittsburgh Forge and Iron Company, Tenth st. near Penn ave., Pittsburgh. Works in the ninth ward, Allegheny. Built in 1864; 38 single puddling furnaces, 14 heating furnaces, 4 trains of rolls, (one 9, one 16, and two 20-inch,) and 11 hammers (three 800-lb., four 1-ton, two 3-ton, and two 4-ton); product, bolts, nuts, bar iron, splice bars, draw bars, links and pins, arch bars, hammered car and locomotive axles, and general railroad and heavy forgings; annual capacity, 24,000 gross tons of rolled and 12,000 tons of forged products. Fuel, coal and manufactured gas. Brands, "P. F. & I." and "Special." Calvin Wells, President and Treasurer; F. E. Richardson, Secretary; Joseph Kaylor, Manager. Selling agents, F. B. Buss, Chicago; George M. Kenyon, St. Paul.

Pittsburgh Iron and Steel Works, J. Painter and Sons Company, Pittsburgh. Works on the South Side. Built in 1834; 10 regenerative heating furnaces and 9 trains of rolls (six 8, one 9, one 10, and one compound 16-inch); product, principally oil, whisky, and trunk hoops; also hoops for pails, tubs, and wooden ware, cotton-ties, lock-steel, stone saws, merchant bands, skelp, and hinge steel; annual capacity, 100,000 gross tons. Fuel, natural gas, producer gas, and coal. Brand, "Painter." A. E. W. Painter, President; Jacob Painter, Jr., Secretary; C. K. Reppert, Treasurer. Selling agents, George P. Bullard & Co., Boston; Ogden & Wallace, New York; Simpser Brothers, Philadelphia; William F. Robertson Steel and Iron Company, Cincinnati; Otis, Hough & Co., Cleveland; Casey & Day, Chicago; L. McGilvray & Scott, St. Louis; John R. Turrentine Company, Wilmington, N. C.; P. P. Williams Company, Vicksburg, Miss.; John K. Speed & Co., Memphis, Tenn.; F. Cannon Commission Company, Galveston, Texas; T. H. Speddy, San Francisco; W. G. Blyth, Toronto, Ontario.

Pittsburgh Steel Works, Anderson, DuPuy & Co., 8 Wood st., Pittsburgh. Works at McKees Rocks, Allegheny county, on the Pittsburgh and Lake Erie Railroad. Established in 1845; present works built in 1882-3; 15 heating furnaces, 3 trains of rolls, (20 and 16-inch and combined 10 and 12-inch,) and 8 hammers (60-lb. to 7-ton); two 33-pot crucible steel-melting furnaces, with an annual capacity of 3,500 gross tons of ingots; first crucible steel made April 11, 1883; one 20-gross-ton acid open-hearth steel furnace, completed in June, 1886, with an annual capacity of 9,000 gross tons of ingots; spring and rake-tooth department attached to works; product, plow, saw, sheet, plate, best edge-tool, agricultural, and all other grades of crucible and open-hearth steel, and forgings and springs of all shapes and kinds; annual capacity, single turn, 6,000 gross tons of rolled and 1,500 tons of forged products. Fuel, natural gas, obtained from the firm's own territory, and coal. Brands, "Keystone" for tool steel and "Diamond" for soft-centre agricultural steel. A department for the manufacture of blacksmiths', miners', and other tools is connected with the works. An elliptic spring department is now being added. David Shaw, Superintendent. Sole proprietors, Herbert DuPuy and David Shaw. Selling agents, Garson Myers, Chicago; E. E. McCargo, sole Eastern agent, Philadelphia and New York.

Pittsburgh Wire Company, Braddock, Allegheny county. Branch office, 232 Fifth ave., Pittsburgh. Built in 1891 and put in operation in February, 1892; 3 heating furnaces, 3 trains of rolls, (9, 12, and 16-inch,) and 102 wire-nail machines; product, steel wire rods, wire, barbed wire, and wire nails; annual capacity of rolled and drawn products, 60,000 gross tons; of wire nails, 570,000 kegs. Fuel, bituminous coal. Thomas Walker, President and Treasurer; James A.

Farrall, Secretary and General Manager; Thomas W. Fitch, General Superintendent; William H. Farrall, Assistant Superintendent.

Pittsburgh Works, American Steel and Wire Company, general office, Rookery Building, Chicago. Pittsburgh office, ninth floor Tradesmen's Building. Works at Rankin Station, Allegheny county. Built in 1885-6 by the Braddock Wire Company; rod mill rebuilt in 1897; 2 heating furnaces, 4 trains of rolls, (two 9, one 12, and one 18-inch,) 110 wire-nail machines, and 85 barbed-wire machines; 4-inch billets rolled directly to No. 5 rods in 18 passes through 4 trains of rolls; product, steel wire rods, plain and galvanized market wire, barbed wire, wire nails, and field fencing; annual capacity, 100,000 gross tons of wire rods and 800,000 kegs of wire nails. Fuel, bituminous coal and manufactured gas. Galvanizing and field fencing plants are connected with the works. (Formerly operated by the Consolidated Steel and Wire Company.) Wallace H. Rowe, Manager; Thomas B. Coles, Assistant Manager. All sales made from the Pittsburgh office. *See Allentown Works in Eastern Pennsylvania for a full list of officers, branch offices, and selling agents. See Beaver Falls Works in Western Pennsylvania, American Steel and Wire Company in Ohio, (Lake Counties District,) and Anderson Works in Indiana.*

Pittsburgh Works, The American Steel Casting Company, Thurlow. Works at Twenty-sixth and Railroad sts., Pittsburgh. Built in 1871; open-hearth steel plant added in 1895; two 20-gross-ton acid furnaces; product, open-hearth steel castings; annual capacity, 12,000 gross tons. Fuel, producer gas, natural gas, coal, and coke. (Crucible steel department abandoned in 1897. Formerly operated by the Pittsburgh Steel Casting Company.) *For a list of branch offices and a full list of officers see Thurlow Works. See Syracuse Works in New York, Thurlow and Norristown Works in Eastern Pennsylvania, Sharon Works in Western Pennsylvania, and Alliance Works in Ohio, (Interior Counties District.)*

Reliance Steel Casting Company Limited, Pittsburgh. Works, corner Thirty-sixth st. and A. V. R. R. Built in 1889; one 24-pot crucible steel-melting furnace; first steel made in September, 1889. Open-hearth steel plant added in 1895; one 5-gross-ton acid furnace. Product, crucible and open-hearth steel castings; annual capacity, single turn, 1,500 gross tons. Fuel, natural gas and coal. Charles Bailey, Chairman; Joseph A. Kelly, Secretary and Treasurer.

Republic Iron Works Department of National Tube Works Company, Twenty-fifth st., South Side, Pittsburgh. Built in 1863; 26 single and 12 double puddling furnaces, 16 heating furnaces, 5 sheet furnaces, and 10 trains of rolls (one 13, one 16, two 20, four 22, and one 24-inch, and one 3-high plate); product, boiler tube and pipe iron and sheet and plate iron; annual capacity, 37,000 gross tons of boiler tube and pipe iron, 7,300 tons of sheet iron, and 7,000 tons of plate

iron. Fuel, natural gas and coal. Brand, "Republic." An extensive galvanizing department is connected with the works. Joseph W. Keffer, Manager. *See Rolling Mills and Steel Works in Allegheny County, (National Tube Works Company.) See Monongahela Furnaces, Allegheny County, Pennsylvania.*

Sable Iron Works, Zug & Co. Limited, Pittsburgh. Works, Thirteenth and Etna sts. Original works built in 1845; 42 single puddling furnaces, 11 heating furnaces, 6 trains of rolls, (one 8, one 10, and one 16-inch, one universal mill, one 18-inch bar mill, and one 3-high 20-inch muck train, 3 stands.) Sheet mill, added in 1895, now contains 6 heating furnaces, 2 producer gas furnaces, 4 annealing furnaces, 6 stands of rolls, (1 pair roughing, 3 pair finishing, and 2 pair cold,) and 2 pair of squaring and 1 pair of doubling shears. An electric plant is connected with both mills and an electric crane with the sheet mill. Product, special irons for use in forging and machine-shop work and railway supplies, including heavy sizes of flats and squares made on universal rolls, high-grade horseshoe bar, black plates for tinning, and steel and iron sheets for corrugating, galvanizing, stamping, expanded metal, and electric work; annual capacity, 22,500 gross tons of bar iron and 7,000 tons of sheets. Fuel, coal, natural gas, and manufactured gas. Brand, "Sable." Charles H. Zug, Chairman; Charles H. Reid, Secretary and Treasurer. Eastern selling agents, Horne Brothers, Boston.

Shoenberger Steel Company, (Juniata Iron and Steel Works,) Pittsburgh. Works, Fifteenth and Etna sts. Established in 1824; 24 gas producers, 12 heating furnaces, 3 soaking pits, 4 annealing furnaces, 12 trains of rolls, (one 8, two 9, one 16-inch, and one 22-inch bar, one 40 x 24-inch, one 48 x 24-inch, one 60 x 24-inch, and one 72 x 24-inch sheet train, one 34 x 127-inch plate train, one blooming-mill train, and one continuous train,) and 12 horseshoe machines. One 12-gross-ton acid open-hearth steel furnace built in 1879 and one 35-gross-ton acid and two 35-gross-ton basic furnaces added in 1896. Two 6-gross-ton Bessemer converters with modern appliances; first blow made March 17, 1886. Product, basic and acid steel plates, sheet steel, skelp steel, iron and steel horse and mule shoes, steel blooms and billets, horseshoe bar, and toe calks; annual capacity, 100,000 gross tons of open-hearth steel ingots, 175,000 tons of Bessemer steel ingots, and 200,000 tons of rolled products. Fuel, natural gas, manufactured gas, and bituminous coal. C. L. Fitzhugh, President; J. Z. Speer, 1st Vice-President; G. A. Steiner, 2d Vice-President; E. P. Loy, Secretary; J. M. Brownson, Treasurer. *See Furnaces in Allegheny County, Pennsylvania.*

Singer, Nimick & Co., Incorporated, 83 Water st., Pittsburgh. Works in the thirty-fourth ward. Built in 1848; 8 single puddling furnaces, 8 converting furnaces, 14 steam hammers, one train of muck

rolls, 4 trains of bar rolls, 5 trains of sheet and plate rolls, one cold rolling mill, and one band mill; one 10-gross-ton acid open-hearth steel furnace, with an annual capacity of 5,800 gross tons of ingots; crucible steel works, with an annual capacity of 12,000 gross tons of ingots; also operate a spring and axle factory and a harrow disc and rolling colter factory; product, tool, saw, sheet, plate, and agricultural steel; also carriage springs and axles and cold-rolled steel. Fuel, natural gas and coal. W. H. Singer, President; G. Bruce Harton, Vice-President; George Singer, Jr., Secretary and Treasurer. Western branch office, 100-104 West Washington st., Chicago; eastern agents, Hogan & Son, 243 Pearl st., New York.

Sligo Rolling Mills, Phillips, Nimick & Co., Pittsburgh. Works on the South Side, below the Monongahela bridge. Built in 1825; 38 single puddling furnaces, 12 heating furnaces, 2 hammers, and 6 trains of rolls (12, 16, 18, 20, 24, and 32-inch); product, bars, angles, sheets, and plates; boiler plates a specialty; make "Sligo" bars and "Tyrone" refined iron; annual capacity, 24,000 gross tons. Fuel, producer gas and coal.

Soho Iron and Steel Works, Laughlin & Co. Limited, lessees, Pittsburgh. Works, Second ave., near Brady st. Built in 1859; 1 single and 2 double heating furnaces, 3 annealing furnaces, 3 trains of rolls, (including a train capable of rolling plates 12 inches thick, 7 feet wide, and 15 tons in weight,) and 1 hammer. Steel department contains two 15-gross-ton acid open-hearth steel furnaces; first steel made November 29, 1883; product, steel plate; annual capacity, 16,500 gross tons. Fuel, natural gas and coal. (Formerly operated by the Pittsburgh Steel and Iron Manufacturing Company.) Henry A. Laughlin, Chairman; James Laughlin, Jr., Secretary and Treasurer. Idle. *See Furnaces in Allegheny County, Pennsylvania, (Laughlin & Co. Limited.)*

Solar Steel Works, William Clark Sons Company, Pittsburgh. Works, Thirty-fifth st., A. V. R. R., and Allegheny river. Built in 1869; 11 heating furnaces and 7 trains of rolls (three 8-inch, one 9-inch, one 10-inch, one 12-inch, and one 20-inch); two 12-gross-ton acid open-hearth steel furnaces added in 1889-90, with an annual capacity of 10,000 gross tons of ingots; one cold-rolled steel mill; product, hoop, band, box, and scroll steel, merchant steel, cotton-ties, steel tire, and cold-rolled steel; annual capacity, 45,000 gross tons. Fuel, natural and manufactured gas. Brands, "Clark" for steel and "Delta" for cotton-ties. F. L. Clark, President; T. S. Clark, Secretary; G. W. Kemp, Treasurer. Western sales office, I. W. Bollinger Company, manager, 133 South Clinton st., Chicago; San Francisco office, F. L. Alderson, manager, 23 Davis st.; New York office, F. Wayland Smith, manager, 26 Cortlandt st.; Boston office, Horne Brothers, managers, 8 Oliver st.; St. Louis office, L. B. & J. D. Ripley, managers, Wainwright Building.

Spang (The) Steel and Iron Company, Pittsburgh. Office and works, Etna, Allegheny county. Built in 1880-1; one 30-gross-ton and one 12-gross-ton basic and one 12-gross-ton acid open-hearth steel furnace, with an annual capacity of 20,000 gross tons of ingots; 7 heating furnaces, one 4-hole soaking pit, one hammer, and 4 trains of rolls (one 30-inch blooming, one 30-inch universal, one 18-inch bar, and one 112 x 31-inch plate); two 3-ton Clapp-Griffiths steel converters built in 1886-7, with an annual capacity of 40,000 gross tons of ingots; first blow made March 1, 1887; product, steel boiler, ship, and tank plates, and machinery steel; annual capacity, 60,000 gross tons. Fuel, natural gas and coal. Walter C. Steele, President; John C. Porter, Secretary and Treasurer; George A. Chalfant, Manager. Selling agents, William H. Wallace & Co., New York; George O. Wales & Co., Boston; B. W. Cotton & Co., Philadelphia; Smith & Jameson, Baltimore; J. L. Adams & Co., Cincinnati; Francis T. West, Chicago. Idle and for sale.

Star Iron and Steel Works, Lindsay & McCutcheon, Allegheny. Office and works, 88 Rebecca st. Branch office, 29 Broadway, New York, Pierson & Co., managers. Built in 1862; 38 single puddling furnaces, 12 heating furnaces, and 8 trains of rolls (four 8, one 10, and one 12-inch, and two muck); product, hoops, bands, horseshoe bar, and cotton-ties; also strap and T hinges, wrought steel shelf brackets, and wrought steel and iron washers; annual capacity, 40,000 gross tons. Fuel, natural gas and coal. Brand, "Star."

Star Tin Plate Company, foot of Twelfth st., Pittsburgh. Built in 1895 and first put in operation January 6, 1896; 8 double heating furnaces and eight 24 x 32-inch hot and nine 22 x 32-inch cold mills; product, black plates for tinning; annual capacity, triple turn, 12,500 gross tons. Fuel, bituminous coal. N. A. Hemphill, President; W. F. Dutton, Secretary and Treasurer. *See Tinplate Works in Pennsylvania.*

Superior Steel Company, Pittsburgh. Works at Carnegie, Allegheny county. Built in 1892 and first put in operation January 3, 1893; 5 heating furnaces, one train of 14-inch hot rolls, and 4 pair of 7 and 4 pair of 10-inch cold rolls; product, hot and cold rolled strip steel; annual capacity, 7,500 gross tons. Fuel, natural gas and coal. Brand, "Superior." James H. Hammond, President; E. M. S. Young, Secretary and Treasurer; F. R. Schneider, Superintendent. Selling agents, Ely & Williams, 10 Mason Building, Boston, 38 Park Row, New York, and 1239 Market st., Philadelphia.

Totten and Hogg Iron and Steel Foundry Company, Twenty-fourth st. and A. V. R. R., Pittsburgh. One 15-gross-ton acid open-hearth steel furnace purchased and removed from W. J. Hammond & Sons' works in 1890-1; product, steel castings. Also operates an iron foundry. George A. Hogg, President; W. A. Beckett, Secretary and Treasurer; F. I. Freeman, Superintendent. Open-hearth furnace idle.

United States Iron and Tin Plate Works, United States Iron and Tin Plate Manufacturing Company, Demmler, (eighth ward, McKeesport,) Allegheny county. Branch office, 626 Liberty st., Pittsburgh. Built in 1873-4; burned and rebuilt in 1883; 11 double sheet-mill furnaces, 5 double annealing furnaces, and 11 trains of sheet rolls; product, specialties in refined and cold-rolled black sheet iron, Bessemer and open-hearth steel sheets, common sheet iron, and tin and terne plates; annual capacity, for black sheets, 18,000 gross tons. Fuel, coal for boilers and natural gas and coal for the remainder of the works. Black sheets branded "U. S. Polished," "Monongahela," "U. S. A. M.," and "J. H." Edward Ely, President; W. C. Cronmeyer, Vice-President and Treasurer; E. R. Crawford, Secretary; W. A. Demmler, Auditor; W. L. Mussler, Assistant Treasurer. Eastern agents, Ely & Williams, Philadelphia, New York, and Boston; St. Louis office, 502 Commercial Building, W. J. Wetstein, agent. *See Tinplate Works in Pennsylvania.*

Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Incorporated, Sharpsburg, Allegheny county. Built in 1846; 28 single puddling furnaces, 10 heating furnaces, one 4-ton hammer, and 5 trains of rolls (one 8, one 15, one 18, one 3-high 19, and one 24-inch); product, skelp, bridge, tank, and bar iron and steel; annual capacity, 22,500 gross tons of rolled products. Fuel, natural gas and coal. Brand, "Vesuvius." John Moorhead, Jr., President; F. T. Moorhead, Vice-President; J. R. Moore, Secretary and Treasurer.

Vulcan Forge and Iron Works, Lockhart Iron and Steel Company, Pittsburgh. Works at McKees Rocks, Allegheny county. Forge built in 1877; rolling mill built in 1882; 31 single puddling furnaces, 5 forge fires, 2 upsetting machines, 7 heating furnaces, 3 trains of rolls, (9, 16, and 23-inch,) and 4 hammers; product, bar iron, bridge iron, soft steel in bars, and hexagon, grooved, and angle iron and steel; annual capacity, 20,000 gross tons of finished rolled iron and steel. Fuel, natural gas and coal. Brands, "Vulcan" and "Lockhart." Charles Lockhart, President; T. J. Gillespie, Secretary and Treasurer.

Wayne Iron and Steel Works, Brown & Co., Incorporated, Pittsburgh. Works, cor. Tenth st. and Duquesne Way. Built in 1825; 34 single puddling and 12 heating furnaces, 5 trains of rolls, 5 hammers, one 36-pot and seven 18-pot crucible steel-melting furnaces, and one 45-ton cementing furnace; product, merchant bar iron and rolled and hammered crucible steel; annual capacity, 16,500 gross tons of iron and 6,500 tons of crucible steel. Fuel, natural gas and coal. Brands, "Wayne" and "U. S." J. Stuart Brown, President and Treasurer; Henry Graham Brown, Vice-President and General Manager; James Neale, Secretary.

West Penn Steel Works, Jennings Steel Company Limited, lessee,

Pittsburgh. Office and works on Preble ave., Allegheny. Built at Leechburg, Armstrong county, in 1881, and removed to present site in 1890; one 10-gross-ton acid open-hearth steel furnace, 3 heating furnaces, one 8-ton hammer, and 2 trains of rolls (one 14 and one 18-inch); product, steel sheet and other bars and strips and light gauges of sheets and plates for stamping purposes; annual capacity, 8,500 gross tons of ingots and 10,700 tons of rolled products. Fuel, producer gas, natural gas, and coal. Brand, "West Penn." Benjamin F. Jennings, Chairman and Treasurer; William N. Howard, Secretary. Selling agents, C. S. Mersick & Co., New Haven, Conn. Owned by Jennings Brothers & Co. Limited.

Williams (The) Company Limited, Carnegie, Allegheny county. Built in 1897 for experimental purposes; 8 crucible steel melting holes, one cementing furnace, and 3 hammers (one 600-lb., one 750-lb., and one 6,000-lb.); product, crucible steel for tools, dies, etc.; annual capacity, 500 gross tons. Fuel, coal, coke, and charcoal. E. G. Husler, Chairman; William H. Shinn, Secretary and Treasurer; H. J. Williams, General Manager.

PROJECTED.

Woodsons (The) Steel Company, Pittsburgh. Contemplates erecting a rolling mill and steel plant on the Monongahela river in Allegheny county, about 12 miles above McKeesport and about 24 miles from Pittsburgh, for the manufacture of Bessemer steel.

Number of rolling mills and steel works in Pittsburgh and Allegheny county: 61 completed and 1 projected. Of these 7 make Bessemer steel and 1 Bessemer steel plant is projected, 1 makes Clapp-Griffiths steel, 19 make open-hearth steel, 10 make crucible steel, and 4 make blister steel.

WESTERN PENNSYLVANIA, EXCEPT ALLEGHENY COUNTY.

Aliquippa Steel Works, Aliquippa Steel Company, 512 Times Building, Pittsburgh. Works at Aliquippa, Beaver county. Built in 1892 and first put in operation October 1, 1892; 8 heating furnaces, 2 welding furnaces, 3 trains of rolls, (two 18-inch and one 26-inch,) and 4 hammers (one 700-lb., one 1,500-lb., one 6-ton, and one 3,000-lb. welding); one 15-gross-ton basic open-hearth steel furnace, with an annual capacity of 6,000 gross tons of ingots; one 36 and one 24-pot crucible steel-melting furnace, with an annual capacity of 4,500 gross tons of ingots; product, special qualities of plate and sheet steel; annual capacity, 10,000 gross tons of finished products. Fuel, producer gas, natural gas, and coal. J. G. Vilsack, President; J. C. Russell, Vice-President; C. A. Fagan, Secretary and Treasurer; J. S. Kaufman, General Manager. Selling agents, D. C. Templeton, 515 Western Union Building, Chicago; C. R. Talbott Company, Cincinnati;

Denman & Davis, 7 Cliff st., New York City; Arthur C. Harvey Company, 115 Purchase st., Boston.

Apollo Iron and Steel Company, Pittsburgh. Two works: one at Apollo, Armstrong county, and the other at Vandergrift, Westmoreland county. Apollo Rolling Mills, at Apollo; built in 1850 and rebuilt in 1886; 4 bar, 12 heating, and 9 annealing furnaces, one 6-ton hammer, and 1 muck and bar train, 6 double sheet mills, and 3 cold mills; two 20-gross-ton acid open-hearth steel furnaces and one ingot heating furnace built in 1885-6; first steel made June 15, 1886; product, black sheets for galvanizing; annual capacity, 14,000 gross tons. Apollo Steel Works, at Vandergrift; built in 1895-6 and first put in partial operation in October, 1895; 3 four-hole Siemens regenerative heating furnaces, one 2-high reversing blooming mill, one continuous bar mill containing 2 groups of 3 pairs of rolls each, 13 double sheet mills, 6 cold mills, and 26 heating furnaces; three 30-gross-ton acid open-hearth steel furnaces; first open-hearth steel made January 11, 1897; product, black and galvanized sheets, acid open-hearth steel ingots, and sheet bars; annual capacity, 70,000 gross tons of ingots, 96,000 tons of sheet bars, 38,000 tons of black sheets, and 51,000 tons of galvanized sheets. Fuel used at both works, natural gas exclusively. Brand, "Apollo." George G. McMurtry, President; James I. Buchanan, Secretary; Wallace P. Bache, Treasurer. Selling agents, Fuller Brothers & Co., 139 Greenwich st., New York; W. J. Wetstein, St. Louis; H. C. McNair, St. Paul; Hoge & Swift, Portland, Oregon; James B. Stokes, San Francisco; W. T. Shannon, Chattanooga; S. L. Mitchel, New Orleans.

Aschman (The) Steel Casting Company, Sharon, Mercer county. Built in 1890-1 and first steel made June 5, 1891; partly destroyed by fire in 1894 and rebuilt in 1895; one 5-gross-ton acid open-hearth steel furnace; product, steel castings; annual capacity, 3,600 gross tons. Fuel, producer gas. E. A. Wheeler, President; W. K. Naylor, Secretary and Manager; J. J. Spearman, Treasurer; Arthur T. Walton, General Salesman.

Atlantic Iron and Steel Company, (successor to Etna Iron Works Limited,) New Castle, Lawrence county. Consolidation, in November, 1874, of the Etna Iron Company and the Onondaga Iron and Nail Company; 3 double and 25 single puddling furnaces, 5 heating furnaces, 55 cut-nail machines, and 4 trains of rolls (8, 16, 2-high 18, and 3-high 18-inch); product, merchant bar iron and skelp iron; annual capacity, 18,000 gross tons. Fuel, coal, and slack with blast for puddling. (Nail factory idle since 1888 and not likely to be operated again.) A. M. Byers, President; A. W. Thompson, Vice-President and Treasurer; Edward N. Ohl, Secretary and Manager. *See Atlantic Furnaces, Shenango Valley, Pennsylvania.*

Beaver Falls Steel Works, Beaver Falls, Beaver county. Built in 1875;

one 24-pot crucible steel-melting furnace, one Siemens and 3 coal heating furnaces, 2 converting furnaces, 3 steam hammers, 4 forge fires, and 2 trains of rolls (one 9 and one 16-inch); steam and water power; product, plow, spring, cutlery, file, and tool steel; annual capacity, 1,500 gross tons of crucible steel ingots and 4,000 tons of rolled products. Fuel, producer gas and coal. Brand, "Beaver." James M. May, Treasurer and Superintendent.

Beaver Falls Works, American Steel and Wire Company, general office, Rookery Building, Chicago; Pittsburgh office, ninth floor Tradesmen's Building. Works at Beaver Falls, Beaver county. Built and put in operation in 1883 by the Hartman Steel Company Limited and enlarged by Carnegie, Phipps & Co. Limited; purchased by the Consolidated Steel and Wire Company in 1895 and enlarged in 1895-6; combination rod train run by 3 engines; 2 heating furnaces, 160 wire blocks, and 142 wire-nail machines; product, steel wire rods, plain, galvanized, and coppered market wire, barbed wire, and wire nails; annual capacity, 100,000 gross tons of wire rods and 850,000 kegs of wire nails. Fuel, producer gas and bituminous coal. (Formerly operated by the Consolidated Steel and Wire Company.) Galvanizing and fence departments are connected with the works. Wallace H. Rowe, Manager; Thomas B. Coles, Assistant Manager. All sales made from the Pittsburgh office. *See Allentown Works in Eastern Pennsylvania for a full list of officers, branch offices, and selling agents. See Pittsburgh Works in Allegheny County, Pennsylvania, American Steel and Wire Company in Ohio, (Lake Counties District,) and Anderson Works in Indiana.*

Blairsville Rolling Mill and Tin Plate Company, Blairsville, Indiana county. Built in 1892 and put in operation in November, 1892; 2 doubling furnaces, 2 annealing and 2 pair furnaces, one 22 x 30 and one 22 x 26-inch hot mill, and three pairs of 18 x 30-inch cold rolls; product, black plates for tinning; annual capacity, 4,500 gross tons. Fuel, coal. T. D. Davis, President; Miss May Dick, Secretary and Treasurer; A. E. Piper, Superintendent. Selling agents, W. F. Potts Son & Co., Philadelphia. *See Tinplate Works in Pennsylvania.*

Braeburn Steel Company Incorporated, Braeburn, Westmoreland county. Telegraph address, Edgecliff. Built in 1897 and first put in operation in October of that year; 1 continuous regenerative and 5 Siemens heating furnaces, one 10 and one 14-inch bar train of rolls, and 4 hammers (one 200-lb. drop, one 500-lb., one 1,500-lb., and one 3-ton); one 5-gross-ton basic Siemens open-hearth steel furnace, with an annual capacity of 3,000 gross tons of ingots; first open-hearth steel made in January, 1898; one 24-pot crucible steel-melting furnace, with an annual capacity of 2,000 tons of ingots; first crucible steel made in November, 1897; product, bar and tool steel; annual capacity, 10,000 gross tons of rolled products and 7,000 tons of forged

products. Fuel, coal, producer gas, and natural gas. Brands, "B.," "BS.," "SBS.," and "HB." William Metcalf, President; R. P. Kelly, Secretary and Treasurer; Charles Metcalf, Managing Director; P. B. Hasbrouck, Chemist and Director.

Buhl Steel Company, Sharon, Mercer county. Built in 1896-7 and first put in operation in May, 1897; six 30-gross-ton basic open-hearth steel furnaces; first steel made May 24, 1897; annual capacity, 110,000 gross tons of ingots; three 4-hole soaking pits, one 35-inch blooming mill, and one 3-high 27-inch finishing mill, having connected with it a 24-inch bullhead mill; product, blooms, slabs, sheet and tinplate bars, and small billets; annual capacity, 100,000 gross tons. Fuel, producer gas. F. H. Buhl, President; Theo. D. Buhl, Vice-President; Veryl Preston, Secretary; David Adams, Treasurer.

Cambria Iron Company, Harrison Building, southwest cor. Fifteenth and Market streets, Philadelphia. Works at Johnstown, Cambria county. First built in 1853; Bessemer steel works made their first blow July 10, 1871; rebuilt and enlarged in 1889 and 1891; four 11½-gross-ton converters; annual capacity, 600,000 gross tons of ingots. Open-hearth steel works, built in 1878-9, now contain two 20-gross-ton furnaces, (1 acid and 1 basic,) one built in 1895 and one in 1896, and two 20-gross-ton basic Wellman furnaces built in 1897; annual capacity, 45,000 gross tons of ingots. Also one 15-ton Krupp washer; annual capacity, 25,000 tons of washed metal. Blooming mill contains 10 Siemens heating furnaces, one 2-high 48-inch blooming mill, one set; one 2-high 40-inch blooming mill, one set; and one 3-high 30-inch billet, slab, and beam mill, four sets. Rolling mills contain 9 Siemens furnaces, 25 reverberatory furnaces, one 28-inch rail mill, three sets; one 21-inch light rail and structural mill, 3 sets; two 21-inch structural and bar mills, three sets each; one 12-inch splice bar mill, four sets; and one 22-inch 2-high puddle mill, four sets; also the following merchant steel mills: one 16-inch 2-high mill; one 10 and 12-inch train, nine sets; one 9-inch train, six sets; one 10-inch train, eight sets; one 12-inch train, four sets; one 14-inch train, eight sets; one 16-inch train, three sets; one 20-inch train, three sets; and one 12-inch cold-rolling train and a cold-drawing plant, with full equipment of furnaces, shears, hammers, and special machinery. Annual capacity of finished steel, 300,000 gross tons of steel rails and 225,000 tons of structural shapes and merchant steel for tire, spring, toe-calk, machinery, plow steel, finger bars, harrow discs, rake teeth, etc. Fuel, coal and producer gas. Officers in Philadelphia: Powell Stackhouse, President; John W. Townsend, Vice-President; J. Lowber Welsh, 2d Vice-President; William S. Robinson, Secretary and Treasurer; A. P. Robinson, Assistant Secretary and Assistant Treasurer. Officers at Johnstown: Charles S. Price, General Manager, and Cyrus Elder, Solicitor and General Agent. Branch offices, New York City:

- for rails, W. A. Washburne, 33 Wall st.; for axles and forgings, L. R. Pomeroy, 33 Wall st.; for structural steel, H. L. Waterman, 100 Broadway; for merchant and agricultural steel, Thomas F. Russell, 102 Chambers st. Chicago, Ill.: for all products, C. J. Ellis, 209 Western Union Building. Detroit, Mich.: for rails, W. F. Jarvis & Co., 49 Newberry Building. Saginaw, Mich.: for rails, Morley Brothers. Toledo, Ohio: for rails, W. E. C. Coxe, 401 The Nasby. Cincinnati, Ohio: for rails, Puchta, Pund & Co., southwest corner Elm and Pearl sts.; for structural steel, J. L. Adams & Co., Neave Building. Cleveland, Ohio: for structural steel, The Bourne-Fuller Company, Perry-Payne Building. Atlanta, Ga.: for all products, F. I. Stone & Co., Southern Agents, 325 Decatur st. St. Louis, Mo.: for rails and structural steel, E. H. Linley Supply Company, 714 North Second st. Omaha, Neb.: for rails and structural steel, Joseph R. Lehmer, 303 South Thirteenth st. St. Paul, Minn.: for rails, George M. Kenyon, 109 Endicott Arcade. Pittsburgh, Pa.: for rails and structural steel, William McLain, 818 Park Building. Philadelphia: for merchant and agricultural steel, J. G. Rittenhouse, Bourse Building. Boston: for structural steel, H. W. Hayes & Co., 70 Kilby st. Louisville, Ky.: for structural steel, Davis, Kelly & Co., 147 Third st. Buffalo, N. Y.: for rails and structural steel, H. W. Kip, 530 Guaranty Building. *See Miscellaneous Coke Furnaces in Western Pennsylvania.*
- Canonsburg Iron and Steel Company, Canonsburg, Washington county. Branch office, Germania Bank Building, Pittsburgh. Built in 1882; 5 single puddling furnaces, 1 knobbling fire, 1 single and 4 double sheet furnaces, 5 pair, 3 pile, and 5 annealing furnaces, 1 hammer, one 3-high bar mill, one 2-high bar mill, one 24 x 42-inch sheet mill, four 24 x 36-inch black-plate mills, and six pair of 22 x 34-inch cold mills; product, finest quality of sheet iron and steel for stamping and tinning purposes; annual capacity, triple turn, 15,000 gross tons. Fuel, natural gas from the company's own wells. H. H. Niemann, President; H. S. Duncan, Vice-President and Business Manager; L. A. Meyran, Secretary and Treasurer; A. H. Geilfuss, Assistant Secretary; Paul C. Herrosee, Auditor; John F. Budke, General Superintendent of Works. *See Tinplate Works in Pennsylvania.*
- Cold Rolled Steel Works, W. H. Nimick, Pittsburgh. Works at New Kensington, Westmoreland county. Built in 1891, destroyed by fire in August, 1892, and rebuilt in 1893; one heating furnace, 3 annealing furnaces, and 3 trains of rolls (one 18-inch hot and two 9-inch cold); product, hot and cold rolled band and strip steel and tack plate; annual capacity, 5,000 gross tons. Fuel, bituminous coal or natural gas. (Formerly operated by Howe, Brown & Co.) Idle and for sale.
- Columbia (The) Iron and Steel Works, Uniontown, Fayette county. Built in 1886-7; two 5-gross-ton Bessemer steel converters; first blow made September 1, 1887; 2 soaking pits, 4 heating furnaces, one 32-

inch blooming mill, and one 26-inch and one 18-inch train of finishing rolls; product, blooms, billets, slabs, beams, channels, angles, tees, bars, and special shapes for architectural and engineering purposes; daily capacity in steel ingots, from 300 to 350 gross tons. Fuel, coal and producer gas. Purchased at sheriff's sale by The Safe Deposit and Trust Company of Pittsburgh as trustee for the first mortgage bondholders. Idle and for sale.

Cyclops Steel Works, Charles Burgess, Titusville, Crawford county. Built in 1879; rebuilt in 1884; 3 single puddling furnaces, 4 heating furnaces, one 16-inch train of rolls, and 5 hammers; crucible steel department has six 6-pot steel-melting holes, with an annual capacity of 1,875 gross tons of ingots; product, special tool steel and refined hammered iron; annual capacity, 1,350 gross tons of hammered products. Fuel, natural gas and coal.

Ellwood Tin Plate Works, Ellwood Tin Plate Company, Perry-Payne Building, Cleveland, Ohio. Works at Ellwood City, Lawrence county. Built in 1892-3 and first put in operation April 1, 1893; 10 heating furnaces, (5 pair and 5 sheet,) two 24 x 30-inch roughing and one 24 x 36 and four 24 x 30-inch sheet mills, all hot, and six 20 x 32-inch cold mills; product, iron and steel sheets, black plates for tinning, and cold-rolled steel sheets; annual capacity, triple turn, 10,000 gross tons. Fuel, coal. (Formerly operated by the Ellwood Steel Company.) H. A. Bishop, President; A. W. Brown, Vice-President and General Manager; J. R. Phillips, Secretary; Charles Babcock, Treasurer. Sales made by the company. *See Tinplate Works in Pennsylvania.*

Franklin Steel Casting Company, Franklin, Venango county. Branch offices, New York, Chicago, and St. Louis. Built in 1895; one 15 and two 12-gross-ton Siemens acid open-hearth steel furnaces; first steel made in December, 1895; product, steel castings; specialties, M. C. B. automatic couplers, draft boxes, and truck bolsters; annual capacity, 8,000 gross tons. Fuel, natural and producer gas. Charles W. Mackey, President; James W. Rowland, 1st Vice-President; Charles Miller, 2d Vice-President; Robert McCalmont, Secretary; W. J. Bleakley, Treasurer; W. B. Corinth, General Superintendent.

Hamilton & Co., twenty-third ward, Pittsburgh. Works at West Newton, Westmoreland county. Built in 1897 and first put in operation in February, 1898; 2 heating furnaces, 1 annealing furnace, and two 24 x 32-inch hot and three 22 x 32-inch cold mills; product, black plates, all consumed in the manufacture of tin andterne plates by John Hamilton and C. W. Cadwallader; annual capacity, 4,000 gross tons. Fuel, bituminous coal. D. H. Williams, Manager.

Hussey, Binns & Co. Limited, 64 Fourth avenue, Pittsburgh. Works originally built at Pittsburgh in 1875; new plant built in 1890-1 at Charleroi, Washington county, on Monongahela Division of the Pennsylvania Railroad; one 24-pot crucible steel-melting furnace, 18 heat-

ing furnaces, 4 trains of rolls, 2 steam and 2 helve hammers, and numerous machines used in shovel making; product, crucible cast steel used by the firm in making shovels, spades, and scoops; annual capacity, 1,350 gross tons of ingots. Fuel, natural gas; coal under boilers. Ralph H. Binns, Chairman; George V. Willson, Secretary, Treasurer, and General Manager; Frank B. Newton, Superintendent.

Hyde Park Iron and Steel Works, Hyde Park Iron and Steel Company, Hyde Park, Westmoreland county. Built in 1895 and first put in operation September 1, 1895; 3 pair furnaces, 3 sheet furnaces, 5 annealing furnaces, and 2 trains of rolls (3 hot mills, 2 roughing mills, and 1 cold rolling mill); product, fine grades of soft steel sheets for stamping, nickeling, japanning, tinning, and galvanizing, including pickled and cold rolled, open pickled, double annealed and cold rolled, and cold rolled and annealed finishes; annual capacity, triple turn, 7,500 gross tons. Fuel, natural gas. Brand, monogram of company. Uriah S. Klingensmith, President; W. E. Lloyd, Vice-President and General Superintendent; E. F. Schauwecker, Secretary and Treasurer. Selling agents, Justice Cox, Jr., Bullitt Building, Philadelphia; John M. Ingram, 109 Hanover st., Baltimore; J. H. Heimbuecher, 200 American Central Building, St. Louis; W. C. Heimbuecher, 100 Lake st., Chicago.

Johnson (The) Company, Johnstown, Cambria county. Principal office, Lorain, Ohio. Original works built in 1887-8 and put in operation May 13, 1888; open-hearth steel department started in 1889; one 2-gross ton acid open-hearth furnace, using oil gas, and one 7-gross-ton acid open-hearth furnace, using producer gas; annual capacity, 6,500 gross tons of street railroad specialties. Also operates switch and drop-forging works, an electric welding plant, and an iron foundry for making rolls and general castings. (One 27-inch train of rolls removed to Lorain, Ohio, in 1895.) *See Rolling Mills and Steel Works in Ohio (Lake Counties District) for a full list of officers and selling agents.*

Johnstown Tinsplate Works, Johnstown Tinsplate Company, 69 Wall st., New York. Works at Johnstown, Cambria county. Built in 1898 and first put in operation in May, 1898; 2 double heating furnaces, 1 annealing furnace, and two 24 x 32-inch hot and three 20 x 36-inch cold mills; product, black plates for tinning; annual capacity, 3,750 gross tons. Fuel, bituminous coal. J. W. Place, President and Treasurer; N. D. Lewis, Vice-President and Manager; J. D. Lewis, Secretary. *See Tinsplate Works in Pennsylvania.*

Keystone Axle Company, 200 Telephone Building, Pittsburgh. Works at Morado, (post office address, Beaver Falls,) Beaver county. Built in 1897 and put in operation in November of the same year; one continuous heating furnace and one train of 48-inch rolls; product, circumferentially rolled car axles; annual capacity, 21,000 gross tons.

Fuel, coal. W. H. Trump, President; D. A. Clark, Vice-President; J. R. Snively, Secretary and Treasurer.

Kimberly (The P. L.) Company, Sharon, Mercer county. Two mills: Atlantic Works, at Sharon, Mercer county, built in 1867; 32 puddling furnaces, 8 heating furnaces, 6 trains of rolls, and 40 cut-nail machines; product, bar, plate, hoop, and rod iron, and nails; annual capacity, 27,000 gross tons of rolled products and 100,000 kegs of cut nails; fuel, coal. Greenville Rolling Mill, at Greenville, Mercer county, built in 1871; 30 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 8, one 10, and one 16-inch); product, hoop and band iron and steel and cotton-ties; annual capacity, 18,000 gross tons; brand, "Atlantic;" fuel, coal. (Both works were formerly operated by the Atlantic Iron and Steel Company.) Peter L. Kimberly, President; George A. Baird, Secretary and Treasurer; William S. Roberts, Superintendent.

Kittanning Iron and Steel Manufacturing Company, Kittanning, Armstrong county. Built in 1848; rebuilt in 1880; 33 single puddling furnaces, 5 heating furnaces, and one 3-high 22-inch train of rolls; product, muck bar; annual capacity, 20,000 gross tons. Fuel, natural gas exclusively. James Mosgrove, President; J. A. Colwell, Vice-President; Henry A. Colwell, Secretary, Treasurer, and Superintendent; Charles T. Neale, General Agent. *See Rebecca Furnace in Western Pennsylvania.*

Latrobe Works, Latrobe Steel Company, Latrobe, Westmoreland county. Main office, 1200 Girard Building, Broad and Chestnut sts., Philadelphia. Built in 1888-9 and put in operation in August, 1889; 7 heating furnaces, 2 trains of tire rolls, and 3 hammers, (1,150-lb., 7-ton, and 20-ton.) Open-hearth steel department contains two 20-gross-ton acid furnaces; first steel made August 5, 1889; annual capacity, 25,000 gross tons of ingots. Product, locomotive and car-wheel tires; annual capacity, 13,500 gross tons. Fuel, natural gas exclusively. Brand, "Latrobe." (Formerly operated by the Latrobe Steel Works.) Marriott C. Smyth, President; Walter H. Bryant, Secretary; Ellwood W. Kimber, Treasurer; Guillaem Aertsen, General Manager; Julian Kennedy, Chief Engineer. *See Melrose Park Works in Illinois.*

Laufman (P. H.) & Co. Limited, Apollo, Armstrong county. Pittsburgh office, Germania Bank Building. Two works: Apollo Sheet Iron Mills, in Westmoreland county, built in 1886; new mill added in 1889; 8 heating furnaces, 4 double annealing furnaces, 2 sets of roughing rolls, 3 sets of finishing rolls, 2 pairs of cold rolls, and one set of bar rolls; product, fine sheet iron, decarbonized sheet steel, black plates for their own consumption, and American roofing plate; annual capacity, 6,000 gross tons; fuel, natural gas and coal. Saltsburg Rolling Mills, Saltsburg, Indiana county, (leased from the Saltsburg Rolling Mill Company,) built in 1894-5 and first put in opera-

tion July 1, 1895; 8 heating furnaces, 4 double annealing furnaces, 2 trains of roughing rolls, one set of bar rolls, one 48 and two 38-inch trains of finishing rolls, and two 48-inch trains of cold rolls; product, fine sheet iron and decarbonized sheet steel; annual capacity, 6,000 gross tons; fuel, natural gas and coal. Brands: for sheet iron, "No. 1 decarbonized;" for terne plates, "Laufman's Apollo;" for galvanized sheets, "Apollo-Juniata." A galvanizing plant is connected with the Saltsburg works. P. H. Laufman, Chairman; Frank W. Jackson, Secretary; W. B. Laufman, Treasurer. *See Tinplate Works in Pennsylvania, (Apollo Sheet Iron Mills.)*

Leechburg Iron Works, Kirkpatrick & Co. Limited, Leechburg, Armstrong county. Branch office, Second National Bank Building, Pittsburgh. Built in 1872; 2 single puddling furnaces, 4 knobbling fires, 16 heating furnaces, 8 annealing furnaces, one bar mill, one 20, one 22, one 23, one 24, and one 25-inch hot and four 22-inch cold mills; one 20-gross-ton basic and one 30-gross-ton acid open-hearth steel furnace, with an annual capacity of 20,000 gross tons of ingots; planished steel department contains 2 hammers and 8 furnaces; product, iron and steel sheets; annual capacity, 10,800 gross tons of sheets. Fuel, natural gas and coal. Brand, "Leechburg." John W. Kirkpatrick, Chairman; J. L. Kirkpatrick, Secretary and Treasurer.

Leechburg Rolling Mill, Leechburg, Armstrong county. Built in 1886; 9 heating furnaces, 3 annealing furnaces, 1 bar and 2 sheet mills, and 3 stands of cold rolls; product, fine sheet steel, light plate steel, and pickled and cold-rolled plates ready for tinning; annual capacity, 6,000 gross tons. Fuel, natural gas and coal. (Formerly called the West Penn Steel Works.) Owned by creditors of Jennings Brothers & Co. Limited. For sale or lease; address George J. Gorman, trustee, lock box 119, Pittsburgh.

Myers (The H. M.) Company, Beaver Falls, Beaver county. New York export office, 9 Stone st. Rolling mill built in 1883; 2 heating furnaces and one train of 16-inch rolls; product, rolled shovel blanks all consumed by the company in its shovel works; annual capacity, 1,200 gross tons. Fuel, coal slack and coke. H. M. Myers, President and Treasurer; C. H. Myers, Vice-President; C. S. Hubbard, Secretary.

National Tin Plate Company of Pennsylvania, Monessen, Westmoreland county. Built in 1897-8 and first put in operation in January, 1898; 12 double heating furnaces, 3 annealing furnaces, and 12 hot and 12 cold mills; product, black plates for tinning; annual capacity, 25,000 gross tons. Fuel, coal. W. H. Donner, President; Joseph I. Irwin, Vice-President; D. P. Erwin, Secretary; Philip Matter, Treasurer. *See Tinplate Works in Pennsylvania.*

Neshannock Sheet and Tin Plate Company, New Castle, Lawrence county. Built in 1873, rebuilt in 1895, and remodeled in 1897-8; 6

pair and 6 heating furnaces, 6 annealing furnaces, one 24 x 36 and five 24 x 32-inch hot mills, and three 22 x 32 and three 22 x 40-inch cold mills; the cold mills are arranged tandem; product, black plates for tinning; annual capacity, 12,000 gross tons. Fuel, natural gas and coal. (Formerly called the Arethusa Iron Works.) George W. Johnson, President; William L. Johnson, Vice-President; O. M. Hartzell, Secretary; G. W. Hartman, Treasurer; Harry Herbert, Superintendent. *See Projected Tinplate Works in Pennsylvania.*

New Castle Steel and Tin Plate Company, (incorporated,) New Castle, Lawrence county. Built in 1892-3 and first put in operation in October, 1893; 14 annealing furnaces, 20 pair furnaces, 20 sheet tin furnaces, twenty 24-inch hot finishing mills, and twenty-one 20 and 22-inch cold mills; product, black plates consumed in the company's tinplate plant; annual capacity, triple turn, 40,000 gross tons. Fuel, bituminous coal. Brand, "New Castle." George Greer, President; John Stevenson, Jr., Vice-President; Charles Greer, Secretary; William S. Foltz, Treasurer. *See Tinplate Works in Pennsylvania.*

New Castle Tube Works, New Castle Tube Company, New Castle, Lawrence county. Built in 1895 and first put in operation in December, 1895; 4 forge fires, 4 heating furnaces, 4 trains of rolls, and two 150-lb. hammers; product, blanks consumed by the company in the manufacture of seamless drawn steel tubes; annual capacity, 2,500 gross tons of blanks and 12,000,000 feet of finished steel tubing. Fuel, coal. John Stevenson, Jr., President; D. C. Wallace, Secretary and Treasurer; John H. Preston, General Manager.

Ohio River (The) Sheet and Tinplate Company, Agnew, Beaver county. Works at Remington Station, P., F. W., & C. R. R. (Remington Station is not a post-office.) Built in 1895 and first put in operation August 22, 1896; two pair of tin furnaces, one 24 x 32 and one 24 x 36-inch hot mill, and one 24 x 32 and one 24 x 36-inch cold mill; product, sheet iron and black plates for tinning; annual capacity, triple turn, 4,300 gross tons. Fuel, coal. Alexander Saulters, President and Manager; W. J. Caskey, Vice-President; A. G. C. Rhodes, Secretary and Treasurer. Selling agents, E. H. Stroud & Co., Chicago.

Old Meadow Rolling Mill Company, Scottdale, Westmoreland county. Building a rolling mill to contain 6 sheet furnaces, 6 pair furnaces, 5 annealing furnaces, one 26 x 54-inch mill, one 24 x 44-inch mill with roughing rolls, and four 24 x 38-inch mills with roughing rolls, all hot; also 2 cold mills; product, sheet iron; annual capacity, 12,000 gross tons. Fuel, natural gas. J. S. Parker, President; A. L. Keister, Vice-President; P. F. McCann, Secretary; A. B. Pickard, Treasurer. Expects to have works completed and in operation in July, 1898.

Pennsylvania Tin Plate Company, New Kensington, Westmoreland county. New York office, Temple Court. Built in 1894 and first put

in operation in 1895; 8 heating furnaces, one 22-inch bar mill and six 24-inch plate mills, all hot, and six 22-inch cold mills; product, tinplate bars, fine sheet steel, and black plates for tinning; annual capacity, 10,000 gross tons. Fuel, coal. Philip Goldsmith, President; Berthold Goldsmith, Vice-President; Julius L. Goldsmith, Secretary and Treasurer. Selling agents, Robert Crooks & Co., 138 Front st., New York. *See Tinplate Works in Pennsylvania.*

Pittsburgh Tin Plate Works, New Kensington, Westmoreland county. Tinning plant built in 1891-2; rolling mill added in 1894 and first black plates made in December, 1894; 12 heating furnaces, 4 annealing furnaces, three 24 x 28-inch, one 24 x 36-inch, and two 24 x 32-inch hot mills, and seven 22 x 36-inch cold mills; product, soft stamping sheets and black plates for tinning; annual capacity, 13,200 gross tons. Fuel, bituminous coal. Charles Parkin, President; C. W. Tindle, Vice-President; W. P. Beaver, Secretary; W. N. Voegtly, Treasurer; J. B. Strawbridge, Manager. Selling agents, Robert Crooks & Co., 138 Front st., New York. *See Tinplate Works in Pennsylvania.*

Pittsburgh Tool Steel Company, 512 Smithfield st., Pittsburgh. Works at Greensburg, Westmoreland county. Built in 1889-90 by the Greensburg Steel Company; part of machinery formerly operated at Philadelphia by the Pennsylvania Steel Refining Company added to works in 1896; 2 forge fires, 3 heating furnaces, 21 treating tanks, one welding furnace, 3 hammers, one 12-pot crucible steel-melting furnace, and one 10 and one 12-inch train of rolls; product, forgings, tool steel, and merchant bar steel; annual capacity, 200 gross tons of forged and 4,800 tons of rolled products. Fuel, bituminous coal. Brand, "Damascus." The crucible pots and trains of rolls are idle. Specialty, "Damascus" steel, made from crucible, open-hearth, and high-grade Bessemer steel by a special process controlled by the Pennsylvania Steel Refining Company. J. C. Jamison, President; Robert Barner, Secretary; Jacob F. Gates, Treasurer; Walter J. Scott, Manager. Selling agents, E. H. Stroud & Co., Chicago; Henderson & Trago, Cleveland; F. M. Shaw, Boston.

Scottdale Iron and Steel Company Limited, Scottdale, Westmoreland county. Built in 1873 and remodeled in 1894 and in 1897; 8 sheet and 8 pair heating furnaces, 6 box annealing furnaces, 8 sheet mills in 4 trains, and 3 cold mills in 1 train; product, iron and steel sheets; annual capacity, triple turn, 17,000 gross tons. Fuel, natural gas. Brand, "Scottdale." P. S. Loucks, Chairman; J. R. Stauffer, Treasurer; C. Grazier, Secretary; R. Skemp, Superintendent. Sales made by the company.

Sharon Iron Company Limited, Sharon, Mercer county. Built in 1850; 10 single and 14 double puddling furnaces, 12 heating furnaces, and 11 trains of rolls (one 8-inch guide, one 12, one 16, and one 18-inch bar, one 20 and three 22-inch sheet, and one 24-inch plate,

hot, and two 24-inch sheet, cold); product, bar, band, hoop, tank, and sheet iron and steel, and light T rails; annual capacity, 30,000 gross tons. Uses producer gas in heating furnaces. A galvanizing plant is connected with the works. F. H. Buhl, President; T. D. Buhl, Vice-President; V. Preston, Secretary; David Adams, Treasurer. *See Furnaces in the Shenango Valley, Pennsylvania.*

Sharon Works, The American Steel Casting Company, Thurlow. Works at Sharon, Mercer county. Built in 1887 and first steel made August 26, 1887; one 12 and one 15-gross-ton acid open-hearth steel furnace; product, open-hearth steel castings of all kinds; annual capacity, 9,000 gross tons. Fuel, producer gas. (Formerly operated by the Sharon Steel Casting Company. Commenced the erection of one 4-gross-ton Bessemer converter in 1891; work suspended; abandoned.) *For list of branch offices and full list of officers see Thurlow Works. See Syracuse Works in New York, Norristown and Thurlow Works in Eastern Pennsylvania, Pittsburgh Works in Allegheny County, Pennsylvania, and Alliance Works in Ohio, (Interior Counties District.)*

Shelby Steel Tube Company, general office, American Trust Building, Cleveland, Ohio. Two works in Pennsylvania: Ellwood Works, (Factory B,) Ellwood City, Lawrence county; built in 1895 and first put in operation in June of that year; 2 heating furnaces, 1 piercing machine, and two 14½-inch trains of rolls; product, blanks for the manufacture of seamless drawn steel tubes; annual capacity, 6,000 gross tons of blanks and about 12,000,000 feet of seamless drawn tubes; fuel, coal; A. A. Avery, Superintendent; (formerly operated by the Ellwood Weldless Tube Company.) Greenville Works, (Factory C,) Greenville, Mercer county; built in 1896 and first put in operation in May, 1897; 3 forge fires, 2 heating furnaces, 1 piercing machine, 3 hammers, (two 150-lb. and one 250-lb.,) and 2 hot and 20 cold trains of rolls; product, blanks for the manufacture of seamless drawn steel tubes; annual capacity, 3,000 gross tons of blanks and 6,000,000 feet of seamless drawn tubes; fuel, bituminous coal and coke; R. T. Brown, Superintendent; (formerly operated by the Greenville Tube Company.) *For list of sales offices and full list of officers see Shelby Steel Tube Company, Interior Counties District, Ohio. See also Lake Counties District, Ohio.*

Shenango Valley Steel Company, New Castle, Lawrence county. Two completed works and one works building, all located at New Castle. Shenango Valley Steel Works; two 8-gross-ton Bessemer converters, built in 1892 and first blow made November 2, 1892; annual capacity, 400,000 gross tons of ingots; one 36-inch blooming mill and two 5-hole soaking pits; one bar mill containing 12 trains of rolls driven by four engines; product, steel billets and 14-inch tinplate and sheet bars; annual capacity, 300,000 gross tons; fuel, coal and producer gas. Shenango Valley Tinplate Works; building a plant to contain

30 sheet and 30 pair furnaces, 12 annealing furnaces, and 30 hot and 27 cold mills; product to be black plates for tinning; annual capacity, 60,000 gross tons. New Castle Wire Nail Works, (formerly operated by the New Castle Wire Nail Company,) built in 1887 and enlarged in 1891; rod mill added in 1889; 3 gas heating furnaces, 4 trains of rolls, (9, 10, 12, and 16-inch,) one hammer, and 300 wire-nail machines; product, wire rods, wire, and wire nails; annual capacity, 90,000 gross tons of rods, 75,000 tons of wire, and 1,250,000 kegs of nails; fuel, coal; brand, "New Castle." William E. Reis, President; William Patterson, Vice-President; George B. Berger, Secretary and Treasurer; John Stevenson, Jr., Superintendent. *See Furnaces in the Shenango Valley and Shenango Valley Tinplate Works in Pennsylvania.*

South Connellsville Plant, Humbert Tin Plate Company, Connellsville, Fayette county. General office and works at South Connellsville. Built in 1896 and first put in operation October 31, 1896; 4 heating furnaces, 4 pair furnaces, and four 24 x 32-inch hot and four 22 x 30-inch cold mills; product, black plates for tinning; annual capacity, 9,000 gross tons. Fuel, coal. (Formerly operated by the Connellsville Sheet Iron and Tin Plate Company.) George J. Humbert, President; H. P. Snyder, Vice-President; W. H. Baldrige, Secretary and Treasurer. *See Tinplate Works in Pennsylvania, (South Connellsville Plant.)*

Stewart Iron Works, Stewart Iron Company Limited, Sharon, Mercer county. Built in 1870; 9 double puddling furnaces, one heating furnace, 2 hammers, (2½ ton and 5-ton,) and two trains of 3-high 18-inch rolls; product, muck bar, "B B" low-phosphorus bars, and hammered blooms for making crucible and open-hearth steel; annual capacity, 11,600 gross tons of either rolled or forged products. Fuel, coal. Brand, "Stewart." Fayette Brown, Chairman, Harvey H. Brown, Treasurer and Selling Agent, and D. B. Chambers, Secretary, Perry-Payne Building, Cleveland, Ohio; Samuel McClure, Agent and Manager, Sharon. *See Stewart Furnace, Shenango Valley, Pennsylvania.*

Tyler (The) Tube and Pipe Company, Washington, Washington county. New York office, 26 Cortlandt st. Built in 1890-1 and first put in operation in January, 1891; 8 forge fires, one run-out fire, 4 heating furnaces, 2 trains of rolls, (16 and 18-inch,) and 2 hammers; product, charcoal blooms and charcoal skelp iron used by the company in the manufacture of boiler tubes; annual capacity, 13,500 gross tons. Fuel, natural gas and charcoal. Brands, "Algerite," "Tyler," and "Diamond T." William P. Tyler, President and Manager; Edward Woodman, Vice-President; Nelson E. Whitaker, Treasurer; Charles S. Stone, Assistant Treasurer and Secretary; C. A. Bumpus, Auditor.

Washington Steel and Tin Plate Mills, Griffiths, Scott & Co., Washington, Washington county. Built in 1896 and first put in operation in

July, 1896; 4 pair heating furnaces, 2 annealing furnaces, and four 24 x 32-inch hot and three 20 x 32-inch cold mills; product, black plates for tinning; annual capacity, 8,400 gross tons. Fuel, natural gas. William H. Griffiths, President and Secretary; John A. Scott, Vice-President and Treasurer; Joseph Phillips, Manager. *See Tinplate Works in Pennsylvania.*

Wheatland Rolling Mill, The South Sharon Steel Company Limited, lessee, Wheatland, Mercer county. Telegraph address, Wheatland for the Western Union and Sharon for the Postal. Built to roll rails in 1872; 13 double puddling furnaces, 7 heating furnaces, and 3 trains of 24-inch rolls; product, muck bar, skelp iron, and Bessemer and open-hearth girder and tee rails; first steel rail rolled by the present company, July 16, 1897; annual capacity, 20,000 gross tons of skelp and muck bar and 90,000 tons of rails. Fuel, bituminous slack coal. J. W. Friend, Chairman; James E. Wood, Secretary; T. S. B. Wood, Treasurer and Manager. (Formerly called the Wheatland Iron Works.) Owned by the Estate of James and Hannah Woods, deceased; The Safe Deposit and Trust Company of Pittsburgh, Trustee and Treasurer.

Wilkes Rolling Mill, Wilkes Rolling Mill Company, Sharon, Mercer county. Built in 1891 and first put in operation in 1892; 5 double puddling furnaces and one 3-high 20-inch train of muck rolls; product, muck bar; annual capacity, 6,000 gross tons. Fuel, bituminous coal. James B. Wilkes, President and Manager; Joseph H. Anderson, Vice-President; Samuel Wilkes, Secretary and Treasurer.

ROLLING MILL COMMENCED BUT NOT COMPLETED.

United States Investment Company, 216-17 Ferguson Block, Pittsburgh. Rolling mill for the manufacture of black plates partly erected at Hammondville, Fayette county, in 1892, by the Blackshaw, Boycott, and Bayliss Iron Company; part of machinery in place; work suspended; purchased by the present owners in 1897. C. T. Russell, President; W. W. Giffen, Secretary.

PROJECTED ROLLING MILLS AND STEEL WORKS.

Frankford (The) Steel and Forging Company, Ellwood City, Lawrence county. Works removed from Frankford, Philadelphia; plant at Ellwood City built in 1895; 4 heating furnaces, 3 steam hammers, and machine shop fully equipped with tools for rough machining and finishing all classes of forgings; product, forged steel axles and locomotive and general steel forgings; annual capacity, single turn, 2,000 gross tons. Contemplates erecting one 10-gross-ton acid open-hearth steel furnace. (Formerly operated by the Frankford Steel Company.) Adam Tindel, President.

West Leechburg Steel and Tin Plate Company, Pittsburgh. Works at West Leechburg, Armstrong county. Building a cold rolling mill to contain 4 cold mills and the necessary machinery for the production of fine cold-rolled steel strips. Contemplates adding hot mills later on. Alfred Hicks, President; J. W. Kirkpatrick, Vice-President; James Lippincott, Secretary; J. L. Kirkpatrick, Treasurer; F. R. Kenyon, General Manager.

Number of rolling mills and steel works in Western Pennsylvania except Pittsburgh and Allegheny county: 54 completed, 2 building, 1 partly built, and 2 projected. Of these 3 make Bessemer steel, 12 make open-hearth steel and 1 open-hearth steel plant is projected, 6 make crucible steel, 1 makes blister steel, and 1 makes special steel.

Total number of rolling mills and steel works in Pennsylvania: 225 completed, 2 building, 1 partly built, and 4 projected. Of these 19 make Bessemer steel and 1 Bessemer steel plant is projected, 1 makes Clapp-Griffiths steel, 48 make open-hearth steel and 3 open-hearth steel plants are projected, 21 make crucible steel and 1 crucible steel plant is projected, 7 make blister steel, and 3 make special steel.

DELAWARE.

Diamond State Iron Company, Wilmington, New Castle county. Philadelphia office, Bourse Building; New York office, 29 Broadway. Two mills: Diamond State Mill, built in 1853; 1 single puddling, 8 double puddling, and 5 heating furnaces, and 3 trains of rolls, (one 10 and two 18-inch.) Old Ferry Mill, built in 1868; burned and rebuilt in 1891; 2 single puddling, 9 double puddling, and 9 heating furnaces, and 8 trains of rolls, (three 9, one 10, one 14, one 16, and two 18-inch.) Product, iron and steel splice bars, track bolts, railroad spikes, boat, wharf, and countersunk spikes, machine bolts, nuts and washers, boiler, boat, and bridge rivets, bridge rods, merchant bars, rivet rods, horseshoe iron, horse and mule shoes, forgings, and castings; total annual capacity, 42,000 gross tons. Fuel, bituminous coal. Brand, the letter "S" inclosed in a diamond. George W. Todd, President and Treasurer; L. A. Bower, Vice-President; Howard T. Wallace, Secretary; John W. Todd, General Superintendent.

Edge Moor Iron Company, Edge Moor, New Castle county. Philadelphia office, 1600 Hamilton st. Rolling mill partly built in 1882 and completed in 1897; 4 heating furnaces and 2 trains of rolls (one roughing train and one 26-inch plate train with rolls 104 inches wide); product, sheared and universal plates; annual capacity, 25,000 gross tons. Fuel, coal. William Sellers, President; John Sellers, Jr., Vice-President; William F. Sellers, Treasurer; H. S. Garrett, Secretary; F. W. Heisler, Purchasing Agent; H. B. Bradford, Manager.

Johnson Forge Company, Wilmington, New Castle county. Built in 1889; 7 puddling and 3 heating furnaces and 2 trains of rolls (3-high 20-inch muck and 3-high 12-inch bar); product, muck and merchant bar iron; annual capacity, 10,000 gross tons of muck bar and 9,000 tons of merchant bar. Operated in connection with a forge. John R. Johnson, President; John Hare, Treasurer.

Marshallton Iron and Steel Company Incorporated, Marshallton, New Castle county. Built in 1836; steam mill built in 1880; enlarged in 1884 and 1889; 3 double puddling furnaces, 4 grate heating furnaces, 2 reverberatory heating furnaces, 3 box annealing furnaces, and 4 trains of rolls (one 20 and three 22-inch); steam and water power; product, sheet iron; annual capacity, 4,000 gross tons. Fuel, anthracite and bituminous coal. Brands, "Star" and "Delaware cleaned." A factory for the manufacture of pans and elbows added in 1889; daily capacity, 2 gross tons. (Formerly operated by the Marshallton Iron Works.) J. R. Bringhurst, President; James W. Wilson, Vice-President; J. A. Robinson, Secretary and Treasurer; James Clark, Superintendent. Sales made by the company.

Minquas Iron Works, McCullough Iron Company, Equitable Building, Wilmington, New Castle county. Built in 1873 and put in operation in 1875; 2 heating, 3 sheet, one gas, and 4 annealing furnaces, 6 trains of rolls, (two 16-inch, three 22-inch, and one 24-inch,) and 1 hammer; product, fine sheet steel and "Harvey's patent cleaned" sheet iron; annual capacity, 6,000 gross tons of rolled products. Fuel, bituminous coal and manufactured gas. Also manufactures galvanized sheet iron and steel, having acquired the galvanizing works of The McDaniel and Harvey Company, of Philadelphia, and removed and re-erected them at Wilmington. Operated by The Girard Life Insurance, Annuity, and Trust Company, of Philadelphia, and Henry Whiteley, Receivers.

Newport Rolling Mills, Marshall Iron Company, Newport, New Castle county. Built in 1873; one double puddling furnace, one reverberatory heating furnace, 2 grate furnaces, 2 annealing furnaces, and three trains of rolls (two 22-inch sheet and one 22-inch bar); product, black sheet iron and sheet steel, Nos. 18 to 28; annual capacity, 2,200 gross tons. Fuel, anthracite and bituminous coal. Brands, a rooster and a diamond. Edward Mendinhall, President; John M. Mendinhall, Secretary; Joseph W. H. Watson, Treasurer. Sales made by the company.

Riverside Iron Works, Delaware Iron Company, New Castle, New Castle county. Philadelphia office, 222-24 South Third st. Mill removed from Bristol, Pa., to New Castle in 1874-5; enlarged in 1879; 4 double puddling furnaces, 3 forge fires, 3 heating furnaces, 2 trains of rolls, and one hammer; product, charcoal boiler plate, tank, and flue iron, and sheared skelp iron; annual capacity, 6,000 gross tons.

Fuel, coal. (Formerly operated by the Riverside Iron Company.) Jonathan Rowland, President; H. C. Vansant, Secretary; William R. McIlvain, Treasurer. For lease.

Wilmington Malleable Iron Company, Wilmington, New Castle county. One 8-gross-ton Siemens open-hearth steel furnace, built in 1895; 6 annealing furnaces; product, malleable iron castings, but can make steel castings; daily capacity, 25 gross tons of agricultural, railroad, and miscellaneous malleable iron castings. Fuel, oil. J. H. Baily, President; James Baily, Treasurer; Charles R. Miller, Secretary.

Wilmington Rolling Mills, The Seidel and Hastings Company, Wilmington, New Castle county. First mill built in 1845, second in 1870, and another in 1875; 6 forge fires, 5 heating furnaces, 3 trains of rolls, (17, 19, and 24-inch,) and 4 hammers; product, charcoal iron boiler plates and plate iron generally; annual capacity, single turn, 3,000 gross tons of blooms and 5,000 tons of plate iron. Fuel, bituminous coal. W. Hastings, President; E. T. Canby, Vice-President; W. P. Hastings, Secretary and Treasurer.

Number of rolling mills and steel works in Delaware: 10. Of these 1 has an open-hearth steel furnace.

MARYLAND.

Baltimore (The) Tinplate Company, Locust Point, Baltimore. Built in 1862 and enlarged since; 8 heating furnaces and 4 hot and 4 cold mills; product, black plates for tinning; annual capacity, 7,000 gross tons. Fuel, coal. Brand, "Baltimore." (Formerly operated by the Baltimore Iron, Steel, and Tinplate Company.) W. H. Harris, President; David Tamplin, Vice-President and Manager; Frank G. Turner, Secretary and Treasurer. *See Tinplate Works in Maryland.*

Cumberland Rolling Mill, Baltimore and Ohio Railroad Company, Cumberland, Allegany county. Main office, Mount Clare, Baltimore. First mill built in 1870 as an iron rail mill; bar mill added in 1873; 3 single and 15 double puddling furnaces, 16 heating furnaces, 8 trains of rolls, (one 9, three 12, one 16, two 23, and one 26-inch,) and 2 hammers; product, bar iron, beams and channels, flange and refined plate, spikes, fish plates, angles, and tees; annual capacity, 26,000 gross tons. Idle and for lease.

Cumberland Steel and Tin Plate Company, Cumberland, Allegany county. Built in 1873-4, rebuilt in 1884, and enlarged in 1889 and 1892; 3 forge fires, 9 heating furnaces, 5 hammers, (one 600-lb., one 1,000-lb., one 1,000-lb. drop, one 1,500-lb., and one 5,000-lb.,) and one 9 and one 16-inch train of rolls, two 24 and three 26-inch sheet mills, one 28-inch plow mill, with one 28-inch roughing, one 28-inch pinion, one 28-inch edging, and one 28-inch finishing stand, and six 22-inch stands of cold rolls; product, all kinds of rolled and hammered tool,

machinery, tire, and agricultural steel, shapes, forgings, rake teeth, crow-bars, claw-bars, etc., and pickled and cold rolled black sheets for tinning; annual capacity, 12,000 gross tons of rolled steel, 1,200 tons of forgings, and 7,500 tons of black plates. One 24-pot crucible steel-melting furnace; first steel made in 1872; product, tool and spring steel, agricultural steel, soft centre steel, etc.; annual capacity, 2,500 gross tons. Fuel, coal. Brand for tool steel, "Crown." (Formerly operated by the Crown and Cumberland Steel Company.) W. C. Dickey, President; W. M. Gordon, Vice-President; H. H. Dickey, Secretary; Edward Bailey, Treasurer.

Maryland Steel Company, Girard Building, Broad and Chestnut sts., Philadelphia. New York office, 2 Wall st.; Boston office, 70 Kilby st. Works at Sparrow's Point, Baltimore county. Built in 1889-92; two 20-gross-ton Bessemer steel converters, 10 pit heating furnaces having a capacity of 12 ingots each, one 34-inch blooming mill, and one 27-inch rail train; first blow made August 1, 1891, and first steel rail rolled August 3, 1891; molten metal direct from the blast furnaces used in the converters; product, billets and standard sections of rails; annual capacity, 300,000 gross tons. Fuel, bituminous coal and petroleum. Brand, "Maryland." An iron and steel shipbuilding plant is connected with the works. F. W. Wood, President, Sparrow's Point; Edmund N. Smith, Secretary and Treasurer, Philadelphia. Selling agents, Stephen W. Baldwin, New York; C. S. Clark, Boston. *See Coke Furnaces in Maryland.*

Stickney (The) Iron Company, Baltimore. Office and works at Canton, a suburb of Baltimore, Baltimore county. Built in 1895 and first put in operation November 5, 1895; 2 pair furnaces and two 24 x 32-inch hot and three 24 x 36-inch cold mills; product, black plates, or sheets, for tinning; annual capacity, 3,300 gross tons. Brand, "Stickney." Fuel, bituminous coal. (Operated for a short time in 1898 under lease by the Humbert Tin Plate Company.) George H. Stickney, President; Harry Bloodsworth, Secretary; John L. Reed, Treasurer. *See Charcoal Furnaces in Maryland. See Tinplate Works in Maryland.*

ROLLING MILL COMMENCED BUT NOT COMPLETED.

South Baltimore Rolling Mill Company, 44 South st., Baltimore. Began in 1892 the erection of a rolling mill at South Baltimore, Anne Arundel county, with machinery from the abandoned mill of the Paterson Iron Company, of Paterson, N. J.; equipment to consist of heating furnaces, trains of rolls, and hammers for the manufacture of plates and other products; nearly completed; work suspended.

Number of rolling mills and steel works in Maryland: 5 completed and 1 nearly completed. Of these 1 makes Bessemer steel and 1 makes crucible steel.

VIRGINIA.

Crescent Horse Shoe and Iron Works, Consolidated Coal, Iron, and Land Company, lessee, Max Meadows, Wythe county. Philadelphia office, Bullitt Building. Built in 1892 and first put in operation November 8, 1892; 8 puddling furnaces, 3 heating furnaces, 3 spike machines, 6 horseshoe machines, and 2 trains of rolls (one 15-inch and one 9-inch); product, merchant bar, band, and hoop iron, horse and mule shoes, and railroad and boat spikes; annual capacity, 15,000 gross tons. Fuel, Pocahontas coal. Brand, "Crescent." Expects to add an 18-inch bar mill. Logan M. Bullitt, President, and Charles S. Thorne, Secretary and Treasurer, 770 Bullitt Building, Philadelphia; William Lang, Superintendent, Max Meadows. Owned by the Crescent Horse Shoe and Iron Company.

Old Dominion Nail Works, Old Dominion Iron and Nail Works Company, Richmond, Henrico county. Works on Belle Isle, in the city of Richmond. Founded early in the present century. Owned, operated, and enlarged by present company since 1858; 10 double puddling furnaces, 11 heating furnaces, including 2 gas heating furnaces with Siemens producers, 1 squeezer, 6 trains of rolls, (two 9, one 10, two 18, and one 20-inch,) and 137 nail machines. Bessemer steel plant built in 1887; two 3-gross-ton converters and blooming mill, with an annual capacity of 60,000 gross tons; first blow made October 10, 1887; idle since 1888. Works operated by 9 turbine water wheels and by steam generated from waste heat of puddling furnaces; product, muck bar, iron and steel cut nails and spikes, merchant, car, and bridge iron, steel wagon tires, horse and mule shoes, etc.; annual capacity, 75,000 gross tons of iron and steel exclusive of steel plant and 300,000 kegs of cut nails. Fuel, bituminous coal and manufactured gas. Brand, "Old Dominion" for nails, bar iron, and horse and mule shoes. Arthur B. Clarke, President and Treasurer; J. B. Carter, Secretary; R. M. Blankenship, General Superintendent. *See Tinplate Works in Virginia.*

Richmond Standard Spike and Iron Company, Richmond. Two works: Manchester Rolling Mill, at Manchester, Chesterfield county, built in 1888-9 and put in operation April 15, 1889; one double gas heating furnace, 2 forge fires, 3 automatic spike machines, and one 9-inch train of rolls; water-power; product, dock, ship, and railroad spikes; annual capacity, 7,200 gross tons; fuel, bituminous coal. Iron Gate Rolling Mill, at Iron Gate, Alleghany county, built in 1890-1; 13 single and 4 double puddling furnaces, 4 forge fires, one double gas and two coal heating furnaces, 3 trains of rolls, (9, 18, and 19-inch,) and one hammer; product, muck bar, bar iron, car shapes, railroad, boat, and ship spikes, and links and pins; annual capacity, 22,500 gross tons; fuel, bituminous coal. Corbin Warwick,

President; Dudley McDonald, Secretary and Treasurer; R. W. Jeffery, General Superintendent.

Roanoke Iron Works, Roanoke, Roanoke county. Built in 1891-2; put in operation in February, 1892; one scrap and 15 double puddling furnaces, one 3-high 22-inch train of muck rolls, and one 8,000-lb. hammer; product, muck and scrap bar; annual capacity, 21,500 gross tons. Brand, "Roanoke." Owned by Robert E. Tod and others, 45 Wall st., New York. Idle and for sale or lease. *See Roanoke Furnace in Virginia.*

Tredegar Iron Works, The Tredegar Company, Richmond, Henrico county. Built in 1836; 9 coal and 7 gas heating furnaces, one scrap furnace, 7 trains of rolls, and 11 hammers; steam and water power; product, merchant bar iron, railroad axles, bridge iron, fish-plates, spikes, chairs, track bolts, links and pins, car iron, and horseshoes; annual capacity, 45,000 gross tons. Fuel, bituminous coal and coke. Brands for horseshoes, "Piedmont," "Cranberry," and "Prairie." Foundry, run by water-power, contains one brass and 2 air furnaces and 4 cupolas; has melting capacity of 135 gross tons per day, and makes car-wheels and castings of all kinds; machine, blacksmith, and boiler shops make car forgings and machinery. Archer Anderson, President; R. S. Archer, Superintendent of Rolling Mills; F. T. Glasgow, Superintendent of Foundry and Machine and Smith Shops; John T. Anderson, General Sales Agent. Selling agents, Crerar, Adams & Co., Chicago.

Virginia Nail and Iron Works, Reusens, Campbell county, $3\frac{1}{2}$ miles above Lynchburg, on the Chesapeake and Ohio Railroad. Built in 1867 and refitted in 1880; nail factory added in 1884 and removed in 1890; 6 double puddling furnaces, one gas and 3 coal heating furnaces, and 3 trains of rolls (10, 18, and 20-inch); water-power; product, guide iron, round, square, and flat bar iron, and light tee rails; annual capacity, 9,000 gross tons. Brand, "Virginia." Idle since 1891. *See Nannie B. Furnace in Virginia.*

Number of rolling mills and steel works in Virginia: 7. Of these 1 has an idle Bessemer steel plant.

WEST VIRGINIA.

Crescent Iron Works, Whitaker Iron Company, Wheeling, Ohio county. Built in 1855; partly destroyed by fire in 1893 and remodeled and rebuilt in 1894; 5 double puddling furnaces, 3 bar and 16 sheet heating furnaces, one bar mill, five 22-inch sheet mills, one 22 and two 24-inch black plate mills, all hot, and five 22-inch cold mills; product, iron and steel sheets, black plates for tinning, and galvanized sheets; annual capacity, 20,000 gross tons. Fuel, bituminous coal and natural gas; chiefly natural gas. Brand, "Crescent." N. E. Whitaker, President; A. C. Whitaker, Secretary.

La Belle Iron Works, Wheeling, Ohio county. Built in 1852 and enlarged since; incorporated on December 3, 1875; 2 regenerative gas heating furnaces, one 3-high 22-inch nail plate or skelp mill, one 2-high nail-plate or skelp mill, one 24 x 36 and nine 24 x 32-inch black plate mills, all hot, and five 22 x 32-inch cold mills; 173 cut-nail machines; product, steel and iron cut nails, steel sheet bars, nail and tack plate, skelp, and black plates for tinning; annual capacity, 400,000 kegs of cut nails, 7,500 gross tons of sheet bars, skelp, or tack plate, and 20,000 tons of black plates. Fuel, natural gas, producer gas, and bituminous coal. Brand, "La Belle." C. A. Robinson, President; J. E. Wright, Secretary; W. H. Travis, General Manager. *See Tinplate Works in West Virginia.*

Riverside Iron Works, Wheeling. Works at Wheeling, Ohio county, and at Benwood, Marshall county. Built in 1859 and enlarged since; 10 regenerative gas heating furnaces, 4 coal heating furnaces, 224 cut-nail machines, and 8 trains of rolls (one 9, one 12, five 21, and one 32-inch); product, bar steel, light T rails, skelp, steel strips and plates, and steel nails; annual capacity, 125,000 gross tons of finished bar steel, tack plate, and skelp, and 550,000 kegs of cut nails. Bessemer steel works built in 1883-4; two 5-gross-ton converters; first blow made June 11, 1884; two 3-hole soaking pits; product, steel used for general purposes; annual capacity, 150,000 gross tons of ingots. Tube works, built in 1887 for the manufacture of all kinds of wrought-iron and steel tubes from $\frac{1}{8}$ inch to 10 inches, contain 7 large regenerative gas heating furnaces, 4 small regenerative gas heating furnaces, and 3 coal heating furnaces; first tube made August 11, 1887; annual capacity, 90,000 gross tons. A galvanizing plant is connected with the tube works. Fuel, manufactured gas and coal. Brand, "Riverside." J. N. Vance, President; John D. Culbertson, Secretary and Treasurer; Frank J. Hearne, General Manager. *See Riverside Furnace in West Virginia and Steubenville Furnace (Miscellaneous Bituminous list) in Ohio.*

Wheeling Steel and Iron Company, Wheeling. Four works, two in Ohio county and two in Marshall county. Belmont Works, at Wheeling, Ohio county, formerly operated by the Belmont Nail Company, built in 1849; 8 single puddling furnaces, 3 regenerative gas heating furnaces, 4 forge fires, 2 trains of rolls, and 152 cut-nail machines; product, nails, made from soft steel slabs; annual capacity, 350,000 kegs; fuel, bituminous coal; brand, "Belmont;" N. Riester, Superintendent. Benwood Works, at Benwood, Marshall county, formerly called Benwood Iron Works, built in 1852, burned in 1876, and rebuilt in 1876-7; 30 single puddling furnaces, 3 gas heating furnaces, 2 trains of rolls, (one muck and one 3-high skelp,) and 130 cut-nail machines; product, steel cut nails, muck bar, and skelp iron; annual nail-manufacturing capacity, 300,000 kegs; fuel, bituminous coal. Top

Mill, at Wheeling, Ohio county, formerly operated by the Wheeling Iron and Nail Company, built in 1867 and rebuilt in 1872; 8 single puddling furnaces, 6 gas heating furnaces, 2 softening and 2 annealing furnaces, 130 cut-nail machines, and 3 trains of rolls (double muck and nail-plate and one 22-inch sheet train of 2 mills); product, iron and steel sheets and steel cut nails and spikes; annual capacity, 3,600 gross tons of sheets and 300,000 kegs of nails and spikes; fuel, bituminous coal; brand, "Top Mill;" H. H. Hornbrook, Superintendent. Wheeling Steel Works, at Benwood, Marshall county; Bessemer steel works built in 1885-6; first blow made August 12, 1886; two 6-gross-ton Bessemer converters, 2 soaking pits, and one 2-high 36-inch blooming mill; product, steel nail slabs, billets, and blooms; annual capacity, 150,000 gross tons of slabs, billets, and blooms; fuel, coal; brand, "W. S. W.;" Charles T. Arnberg, Superintendent. C. R. Hubbard, President and General Manager; J. D. DuBois, Secretary; Charles C. Woods, Assistant Secretary and Treasurer; H. G. Tinker, Sales Agent. *See Furnaces in West Virginia and Martin's Ferry Furnace (Miscellaneous Bituminous list) in Ohio.*

Number of rolling mills and steel works in West Virginia: 7. Of these 2 make Bessemer steel.

KENTUCKY.

American Nut and Bolt Company, Newport, Campbell county. Rebuilt and fitted with new machinery in 1874; 5 single puddling furnaces, 5 heating furnaces, 2 scrap furnaces, and 4 trains of rolls (one 10, one 18, and two 20-inch); product, bar, roofing, and stove-pipe iron, bridge rods, bolts and nuts, and gimlet-pointed coach screws; annual capacity, 12,000 gross tons. Fuel, bituminous coal. (Formerly called the Anchor Iron and Steel Works; operated in 1895 by the American Iron and Bolt Company.) C. W. Scofield, President; A. S. Upson, Vice-President; James Lord, Secretary and Treasurer.

Ashland Steel Company Incorporated, Ashland, Boyd county. Built in 1891; two 5½-gross-ton Bessemer steel converters, two 4-hole gas-fired soaking pit furnaces, and one 32-inch blooming mill; first blow made December 26, 1891; product, billets and slabs; annual capacity, 150,000 gross tons of ingots. Fuel, coal for steam and producer gas for furnaces. Contemplates adding a rod mill and a wire-drawing plant. I. A. Kelly, President; E. C. Means, Vice-President; B. H. Burr, Secretary; L. R. Putnam, Treasurer.

Ewald Iron Company, 941 North Second street, St. Louis. Two mills: Tennessee Rolling Works, at Tennessee Rolling Works, Lyon county, built in 1846; 6 single puddling furnaces, 13 knobbling fires, 6 heating furnaces, 3 trains of rolls, and one hammer; annual capacity, 3,600 gross tons; not in operation. Tennessee Rolling Mills, at Louisville, Jefferson county, formerly called Kentucky Rolling Mill, built

in 1869; 14 single puddling furnaces, 6 heating furnaces, 12 knobbling fires, one bloom forge, one annealing furnace, 2 steam shingling hammers, and 5 trains of rolls (8, 12, 18, 100-inch plate, and 72-inch plate and sheet with chilled rolls); product, bar, guide, plate, and sheet iron, tank, shell, and flange steel plates; annual capacity, single turn, 9,000 gross tons. Brands of iron, "Tennessee Charcoal Bloom Staybolt," "E. I. C. Charcoal," and "Laurel" charcoal iron. L. P. Ewald, President; Thomas Shaver, Secretary; George P. Hermann, Assistant Secretary.

Licking Iron Works, Licking Rolling Mill Company, Covington, Kenton county. Built in 1845; 6 double puddling, 4 Lauth heating, and 2 scrap furnaces, one 5-ton steam hammer, one 8, one 12, and one 16-inch train of rolls, and two 22 x 30-inch sheet mills, all hot, and two 22 x 38-inch cold mills; product, merchant bar, bridge, boiler, and sheet iron, angle, tee, jail, and sash iron; also black plates for tinning for their own use; special products, boiler plate, shafting, charcoal bar, angle, and tee iron; annual capacity, 12,000 gross tons. Fuel, coal. I. Droege, Jr., President; F. J. Droege, Vice-President; F. A. Droege, Secretary; J. C. Droege, Treasurer. *See Tinplate Works in Kentucky.*

Mitchell, Tranter & Co., Second and Elm sts., Cincinnati. Works at Covington, Kenton county. Built in 1873; 4 knobbling, 11 puddling, 3 scrap, 2 slab, 2 plate-mill, 2 annealing, and 5 heating furnaces, two 5-ton steam hammers, and one 18-inch muck mill, one 8 and one 10-inch guide mill, one 20-inch bar mill, one 24-inch sheet mill, and one 26-inch plate mill; one 7-gross-ton Siemens acid open-hearth steel furnace, built in 1879, with an annual capacity of 4,500 gross tons of ingots; product, plate, sheet, channel, angle, and merchant iron, boiler plate, and plow steel; annual capacity, single turn, 15,500 gross tons. Fuel, coal. Brand, "Crown" horseshoe bar and refined iron. Works may be removed to Indiana. James Tranter, President; Watson W. Tranter, Vice-President; George M. Clark, Treasurer; James A. Sebastiani, Secretary.

Newport Rolling Mill Company, Newport, Campbell county. Built in 1857 and rebuilt throughout in 1891; 8 single puddling and 8 heating furnaces, 8 box annealing furnaces, and 8 trains of rolls (6 hot and 2 cold); product, steel sheets for roofing, corrugating, and galvanizing purposes; annual capacity, triple turn, 15,000 gross tons. Fuel, coal. Brands, "Newport Best," "Juniata," "Globe," and "Newport Steel." (Formerly called Swift's Iron and Steel Works.) A plant for the production of galvanized sheets, etc., is connected with the works. May add 2 sheet mills. A. L. Andrews, President; J. A. Andrews, Secretary, Treasurer, and General Manager.

Norton Iron Works, Ashland, Boyd county. Put in operation in March, 1874; burned and rebuilt in 1883; 20 single puddling furnaces, 4

heating furnaces, 2 Smith gas furnaces, 126 cut-nail machines, and 2 trains of rolls (one 20 and one 22-inch); product, steel nails and cut and wrought spikes; annual capacity, 350,000 kegs. Fuel, coal and producer gas. Brand, "Norton." M. H. Houston, President; T. M. Adams, Vice-President; J. Russell Houston, Secretary; W. C. Richardson, Treasurer.

Watts (The) Steel and Iron Syndicate Limited, Middlesborough, Bell county. Built in 1890-3; seven 25-gross-ton basic open-hearth steel furnaces, (4 completed and 3 partly completed,) two 4-hole soaking pits, and one 32-inch blooming mill; product, billets, blooms, and slabs; annual capacity, 75,000 gross tons. Fuel, producer gas. Brand, "Middlesborough." Edmund Hannay Watts, Chairman, and R. A. Andrews, Secretary, London, England; Edgar Watts, Managing Director in America. *See Furnaces in Kentucky.*

Number of rolling mills and steel works in Kentucky: 9. Of these 1 makes Bessemer steel and 2 make open-hearth steel.

TENNESSEE.

Harriman Muck Bar Mill, D. W. Duke, Harriman, Roane county. Built in 1892 and first put in operation in March, 1893; one double puddling furnace, one heating furnace, and one 20-inch 3-high muck train of rolls; product, muck bar and arch iron for railroads; annual capacity, 5,500 gross tons. Fuel, coal. (Formerly called the Harriman Rolling Mill.) W. R. Muir, Manager.

Harriman Rolling Mill, W. B. Crinkley, Manager, Harriman, Roane county. Built at Chattanooga and first started in October, 1876; removed to Harriman in 1891 and put in operation in September, 1891; 20 single puddling furnaces, 3 heating furnaces, one hammer, and 3 trains of rolls (18-inch muck, 16-inch bar, and 8-inch guide); product, bar iron, 12 to 30-lb. T rails, all sizes of fish-plates, light sections of angle and channel iron, and iron and steel fence posts; annual capacity, 16,500 gross tons. Fuel, coal. (Formerly operated by the Harriman Iron Company.) For sale.

Knoxville Iron Company, Knoxville, Knox county. Built in 1865; 9 single and 4 double puddling furnaces, one coal and 2 gas heating furnaces, 41 cut-nail machines, (idle,) and 4 trains of rolls (8, 15, 16, and 18-inch); product, merchant bars, railroad spikes, fish-plates, bolts, and light T and street rails; annual capacity, 15,000 gross tons. Fuel, manufactured gas and coal. Brand, "K. I. Co." Expects to put in additional puddling and heating furnaces. William P. Chamberlain, President; T. I. Stephenson, Vice-President and General Manager; Otis A. Brown, Secretary and Treasurer. Sales made by the company.

Southern (The) Steel Works, John Leighton & Sons, 610-14 Boyce

street, Chattanooga, Hamilton county. Removed from Kingston in 1877; remodeled and enlarged in 1883; one single puddling and one heating furnace, two 8-pot crucible steel-melting furnaces, with an annual capacity, single turn, of 675 gross tons, and one 2,000-lb. hammer; product, crucible tool steel, forgings, and steel castings. Fuel, coal and coke.

Number of rolling mills and steel works in Tennessee: 4. Of these 1 makes crucible steel.

GEORGIA.

Georgia Cotton Tie Mill, Langston & Woodson, lessees, Atlanta. Works at Rome, Floyd county. Built in 1889 and put in operation in July, 1889; 4 double puddling furnaces, 2 heating furnaces, 2 trains of rolls, (10 and 16-inch,) and one hammer; product, bar, band, and hoop iron, and cotton-ties; annual capacity, single turn, 2,700 gross tons. Fuel, coal. (Formerly operated by the Georgia Cotton Tie Company.) Works owned by Harper Hamilton and others.

Number of rolling mills in Georgia: 1.

ALABAMA.

Alabama Iron and Steel Company, A. J. Perry, Receiver, Brierfield, Bibb county. Built in 1863, rebuilt in 1882-3, and put in operation in August, 1883; 10 double and 4 single puddling furnaces, 5 heating furnaces, three 18-inch trains of rolls, and 72 cut-nail machines; product, merchant bar iron and nails; annual capacity, 12,000 gross tons. Fuel, coke. (Formerly called the Brierfield Rolling Mill.) E. T. Peter, Secretary. *See Bibb Furnace (charcoal) in Alabama.*

Alabama Rolling Mill Company, Birmingham, Jefferson county. Works at Gate City, Jefferson county. Built in 1887-8 and put in operation in February, 1888; 23 single puddling furnaces, 2 gas heating furnaces, and 3 trains of rolls (18-inch muck and 8 and 16-inch bar); product, bars, bands, hoops, light T rails, angles from 1 to 2½ inches, and light channels; annual capacity, 24,000 gross tons. Fuel, coal in puddling furnaces and manufactured gas in heating furnaces. W. J. Behan, President; W. H. Hassinger, Vice-President and General Manager; D. M. Forker, Secretary and Treasurer.

Alabama Steel Works, (incorporated,) Fort Payne, DeKalb county. Built in 1889-90; two 15-gross-ton basic open-hearth steel furnaces; first steel made in July, 1893; 4 gas heating furnaces and 2 trains of rolls (one 2-high 32-inch reversing and one 22-inch nail plate); product, ingots, blooms, billets, and slabs; annual capacity, 10,000 gross tons of ingots. Fuel, producer gas. (Formerly called the Fort Payne Rolling Mill.) J. A. Wilder, President; J. K. Lanning, Vice-President and Treasurer.

Anniston Rolling Mills, Anniston Iron and Steel Company, lessee, An-

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- niston, Calhoun county. Built in 1890-1; 12 single puddling furnaces, 2 large heating furnaces, and 2 trains of rolls, (3-high 20-inch muck and 3-high 12-inch finishing.) Fuel, coal. J. K. Dimmick, President; H. B. Cooper, Vice-President and General Manager; John S. Mooring, Secretary and Treasurer. Owned by the Anniston Rolling Mills Company.
- Bessemer (The) Rolling Mills, Bessemer, Jefferson county. Built in 1887-8 and put in operation in September, 1888; 24 single puddling furnaces, 6 heating furnaces, 5 trains of rolls, (one 20-inch muck, one 8-inch guide, one 16-inch bar, one 22-inch sheet, and one 26-inch plate,) and 3 Siemens gas producers; product, bar, guide, plate, and sheet iron; annual capacity, 27,000 gross tons. Fuel, coal and manufactured gas. Owned by Morris Adler, of Birmingham, and others. Idle since the spring of 1891 and for sale.
- Birmingham Rolling Mills, Birmingham Rolling Mill Company, Birmingham, Jefferson county. Built in 1880 and first put in operation in July, 1880; enlarged in 1887 and 1895; 11 double and 24 single puddling furnaces, one scrap gas furnace, 7 gas, 4 box annealing, 2 pair, and 4 sheet heating and annealing furnaces, and 9 trains of rolls, (two 8-inch guide, one 16-inch bar, two 18-inch forge, two 24-inch sheet, one 26-inch plate, and one 24-inch finishing.) Open-hearth steel department, containing two Siemens 30-gross-ton basic furnaces, built in 1897; first steel made July 22, 1897; annual capacity, 30,000 gross tons of ingots. Product, iron and open-hearth steel bars, plates, sheets, angles, round-edge tire, small T rails, fish-plates, etc.; annual capacity, 70,000 gross tons. Fuel, producer gas and coal. James G. Caldwell, President; Thomas Ward, General Manager; J. D. Dwyer, Superintendent; J. H. Mohns, Salesman.
- Illinois (The) Car and Equipment Company, Anniston, Calhoun county. Chicago office, 1480 Old Colony Building; branch office, 66 Beaver st., New York. Built in 1884 and enlarged in 1888-9 and 1893; 1 single and 6 double puddling furnaces, 6 heating furnaces, 2 scrap furnaces, 2 trains of rolls, (one 18-inch muck and bar train and one 10-inch merchant and guide,) and 5 hammers (one 6,000-lb., two 4,000-lb., and two helve); product, car axles and merchant bar iron; annual capacity, 9,000 gross tons of forged and 30,000 tons of rolled products. Fuel, coal. (Formerly operated by The United States Car Company.) David Cornfoot, President, London, England; H. A. Ware, Vice-President, S. M. Dix, Secretary and Treasurer, and J. M. Maris, General Manager, Chicago, Illinois; O. M. Stimson, General Superintendent, Anniston, Alabama.
- Jefferson Steel and Manufacturing Company, Birmingham, Jefferson county. Built in 1889-90; one 15-gross-ton basic open-hearth steel furnace; first steel made April 24, 1890; product, ingots; annual capacity, 8,100 gross tons. Fuel, manufactured gas. Brand, "Jefferson."

(This furnace takes the place of one experimental Henderson open-hearth steel furnace built in 1887-8 and first steel made February 27, 1888. Formerly operated by the Jefferson Steel Company.) Hawkins steel was experimentally produced at these works in 1897. C. F. Enslen, President; E. F. Enslen, Secretary, Treasurer, and General Manager. Idle and for sale or lease.

Sheffield Rolling Mill, Sheffield Rolling Mill Company, Sheffield, Colbert county. Built in 1897-8, utilizing machinery from the abandoned Midway Iron Works and Roanoke Rolling Mill, at Roanoke, Virginia; 12 double puddling furnaces, 5 heating furnaces, and 4 trains of rolls (one 3-high 18-inch muck and billet, one 3-high 16-inch bar, and two 10-inch guide); product, bar, angle, rod, and band iron, small size T rails, D links and cotton-ties, and railroad and boat spikes; annual capacity, 20,000 gross tons. Fuel, bituminous coal. Expects to commence operations in May, 1898. Officers not elected when the Directory went to press.

Shelby Rolling Mill, Helena, Shelby county. Works started in March, 1873; enlarged in 1889; 10 single puddling furnaces, 3 heating furnaces, and 4 trains of rolls; product, merchant bar and band iron and light T rails; annual capacity, 7,200 gross tons. (Formerly called the Central Iron Works.) Company failed; works idle for several years. Address, Capitol City Insurance Company, Montgomery, Alabama, or Alabama National Bank, Birmingham, Alabama. For sale or lease.

Number of rolling mills and steel works in Alabama: 10. Of these 3 have open-hearth steel plants.

TEXAS.

Texas Iron Rolling Mill, H. H. Rowland, Tyler, Smith county. Built in 1891-2 and equipped with machinery from mill partly erected at Fort Worth in 1890; first put in operation in June, 1892; one heating furnace and 2 trains of rolls (one 9 and one 18-inch); product, merchant bars, cotton-ties, rail splices, and bolts and nuts; annual capacity, 4,500 gross tons. Fuel, coal. For sale or lease.

ROLLING MILL COMMENCED BUT NOT COMPLETED.

Jefferson Iron Company, Jefferson, Marion county. Rolling mill partly erected in 1891 by the Lone Star Iron Company; to contain 15 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 18-inch muck and one 8-inch and one 12-inch bar); buildings partly erected and all the machinery on the ground; work suspended. *See Jefferson Furnace in Texas.*

Number of rolling mills in Texas: 1 completed and 1 commenced but not completed.

OHIO.

LAKE COUNTIES.

American Steel and Wire Company, general office, Rookery Building, Chicago. Three works at Cleveland, Cuyahoga county. Consolidated Works: wire-drawing and wire-nail plants built in 1890-1 by The Baackes Wire Nail Company; rod mill added in 1892; 3 heating furnaces, 139 wire-drawing blocks, 272 wire-nail machines, 60 barbed-wire machines, and one 9, one 12, and one 16-inch train of rolls; product, steel wire rods, wire, wire nails, and Consolidated field fencing; annual capacity, 60,000 gross tons of rods, 80,000 gross tons of wire, and 1,000,000 kegs of nails; fuel, producer gas and coal; a galvanizing plant is connected with the works; G. H. Schuler, Manager; (formerly operated by The Baackes Wire Nail Company; later by the Consolidated Steel and Wire Company.) American Works: built in 1886 by the American Wire Company and first put in operation in November, 1886; new rod mill built in 1888 and first put in operation in January, 1889; one Belgian rod mill, with 6 gas producers, 4 heating furnaces, and 4 trains of rolls; one continuous rod mill, with 3 gas producers, 2 heating furnaces, and 3 trains of rolls; 19 wire-nail machines; product, steel wire rods and wire nails; annual capacity, 100,000 gross tons of rods and 90,000 kegs of wire nails; fuel, coal; also operate a wire-drawing plant; G. H. Schuler, Manager, and T. H. Taylor, Assistant Manager; (formerly operated by the American Wire Company.) HP Nail Works: built in 1880 by the HP Nail Company and first put in operation in March, 1880; enlarged in 1891; 3 large gas heating furnaces, one 9-inch, one 12-inch, and one 16-inch train of rolls, and 360 wire-nail machines; product, steel wire rods, steel wire, galvanized wire, wire nails, staples, tacks, rivets, cold-drawn shafting, and welded chains; annual capacity, 60,000 gross tons of rods and 90,000 tons of finished products; wire-nail capacity, 1,500,000 kegs; galvanizing plant connected with the works has an annual capacity of 4,500 gross tons of wire; fuel, coal for boilers and producer gas for the rod mill; G. H. Schuler, Manager, and A. T. De Forest, Assistant Manager; (formerly operated by the HP Nail Company.) *See Allentown Works in Eastern Pennsylvania for a full list of officers, branch offices, and selling agents. See also Pittsburgh Works in Allegheny County, Beaver Falls Works in Western Pennsylvania, and Anderson Works in Indiana.*

Britton (The) Rolling Mill Company, 66 Hoyt ave., Cleveland, Cuyahoga county. Built in 1890-1 and started in May, 1891; 6 heating furnaces, 2 annealing furnaces, and three 24-inch hot and three 22-inch cold mills; product, soft steel sheets and black plates for tinning; annual capacity, triple turn, 6,000 gross tons. Fuel, coal and petroleum. Brands, "Britton" and "Buckeye." J. W. Britton, Presi-

dent; F. W. Britton, Vice-President and General Manager; C. R. Britton, Secretary; A. M. Britton, Treasurer. *See Tinplate Works in Ohio.* Cleveland (The) Hardware Company, Lake st., between Belden and Kirtland sts., Cleveland. Built in 1879; destroyed by fire in June, 1891, and entirely rebuilt; one heating furnace, with Smith & Laughlin gas producer, and one 10-inch train of rolls; product, shapes for wagon, carriage, and sleigh hardware rolled from soft steel; annual capacity, 12,000 gross tons. Fuel, bituminous coal and manufactured gas. Lee McBride, President; Charles E. Adams, Vice-President and General Manager; Thomas P. Robbins, Secretary and Treasurer.

Cleveland Rolling Mill Company, Western Reserve Building, Cleveland. Works chiefly located at Newburgh, Cuyahoga county. Bessemer steel works built in 1867-8 and remodeled and fitted with modern appliances in 1893; first blow made October 15, 1868; two 10-gross-ton converters; annual capacity, 350,000 gross tons of ingots. Open-hearth steel works built in 1876-8; two 15-gross-ton basic open-hearth furnaces; annual capacity, 20,000 gross tons of ingots. Blooming mill built in 1881 and remodeled in 1891; 3 soaking pits and 2 trains of rolls (one 2-high 33-inch reversing and one 3-high 23-inch); annual capacity, 225,000 tons of blooms, billets, and slabs. Rail mill built in 1857 and remodeled in 1895; 5 heating furnaces and one train of rolls; annual capacity, 100,000 tons of standard rails, girder rails, beams, channels, etc. Two rod mills; annual capacity, 100,000 tons. Wire mills, built in 1868, have an annual output of 90,000 tons of finished wire. Also a barbed-wire plant; annual capacity, 18,000 tons. Also a wire-nail mill with 30 machines and an annual capacity of 200,000 kegs. Structural and bar mills contain one 22-inch structural train of rolls, one 18-inch and one 12-inch bar train, one 9-inch guide and merchant train, and one hoop mill; annual capacity, 55,000 tons of merchant bars and shapes. The company also has a foundry, a forge, machine shop, barbed-wire-fence manufactory, and 3 blast furnaces. Product, Bessemer and open-hearth steel blooms, billets, and slabs, beams, channels, angles, and other structural shapes, Bessemer steel rails, girder rails, small T and tram rails, steel wire rods, merchant, spring, toe-calk, and sleigh-shoe steel, steel tires, hoops, and forgings, plain and barbed wire, and wire nails. Fuel, coal for steam and manufactured gas for heating. William Chisholm, President; W. B. Chisholm, Vice-President; Ed. S. Page, Secretary. *See Furnaces in Ohio, (Lake Counties District.)*

Cleveland (The) Steel Casting Company, 14 Winter st., Cleveland, Cuyahoga county. Works on Hubbard st. and the Cleveland and Pittsburgh Railroad. Built in 1893; first steel made January 9, 1895; one 15-gross-ton acid open-hearth steel furnace; product, steel castings; annual capacity, 9,500 gross tons. Fuel, producer gas. W. W. Balkwill, President; N. P. Bowler, Treasurer; Charles Seelbach, Secretary.

Cleveland (The) Steel Company, Cleveland, Cuyahoga county. Built in 1853 and rebuilt in 1873 and 1891; remodeled in 1894; 5 heating furnaces and 2 trains of rolls, containing 2 plate and 2 sheet mills. Two 15-gross-ton open-hearth steel furnaces, one basic and one acid, added in 1897; first open-hearth steel made in May, 1897; annual capacity, 15,000 gross tons of ingots. Product, light steel plates and sheets; annual capacity, 30,000 gross tons. Fuel, oil and coal. (Formerly operated by the Britton Iron and Steel Company.) Frank Rockefeller, President; John A. Potter, Vice-President; L. H. Severance, Secretary; H. E. Higgins, Treasurer.

Crescent (The) Sheet and Tin Plate Company, Cleveland, Cuyahoga county. Built in 1895 and first put in operation June 1, 1895; 6 pair and 6 heating furnaces, six 24 x 32-inch hot mills, and six 20 x 30-inch cold mills; product, black plates for tinning and stamping; annual capacity, 13,000 gross tons. Fuel, coal. H. P. McIntosh, President; A. B. Foster, Vice-President; J. A. Mathews, Secretary and Treasurer; John D. Paton, Superintendent. *See Tinplate Works in Ohio.*

Johnson (The) Company, Lorain, Lorain county. Built in 1894-5, using rail-mill machinery removed from the company's works at Johnstown, Pa.; 4 gas heating furnaces and one 27-inch train of rolls; product, billets, girder and T rails, and street railroad specialties; annual capacity, 180,000 gross tons. Bessemer steel department contains two 12-gross-ton acid converters; first steel made April 1, 1895; 12 soaking pits; product, Bessemer steel ingots; annual capacity, 300,000 gross tons. Fuel, coal and producer gas. A. J. Moxham, President; Tom L. Johnson, 1st Vice-President; Daniel Coolidge, 2d Vice-President; P. M. Boyd, Secretary; William A. Donaldson, Treasurer; Max M. Suppes, General Manager. Selling agents, Randolph Clitz, Exchange Building, Boston; H. C. Evans, Mutual Life Building, New York; W. E. Boughton, Bullitt Building, Philadelphia; O. C. Evans, Mitchell Building, Cincinnati; Littlefield & Meysenburg, Monadnock Building, Chicago, and Bank of Commerce Building, St. Louis; S. P. S. Ellis, Penn Building, Pittsburgh; William W. Kingston, Equitable Building, Atlanta. *See Rolling Mills and Steel Works in Western Pennsylvania.*

Lake Erie Iron Works, Lake Erie Iron Company, 155 St. Clair st., Cleveland, Cuyahoga county. Built in 1852; 16 single puddling and 19 heating furnaces, 4 trains of rolls, (8, 9, and 18-inch,) and 13 hammers; product, locomotive and car axles, iron and steel forgings of every description, iron shafting up to 20-inch round, and merchant bar iron; annual capacity, 23,000 gross tons of rolled and 7,000 tons of forged products. Nut and bolt works have a daily capacity of 45 gross tons of nuts and bolts used by railroads, carbuilders, and by agricultural implement makers. Fuel, bituminous coal

and manufactured gas in the rolling mill and fuel oil in the nut and bolt works. W. C. Scofield, President; Edward Lewis, Vice-President; C. W. Scofield, Secretary and Treasurer; F. R. Scofield, Superintendent of nut and bolt works.

Otis (The) Steel Company Limited, Cleveland, Cuyahoga county. Built in 1873-4 and put in operation January 1, 1875; 18 Siemens heating furnaces, 10 hammers, 7 open-hearth steel furnaces (two 18 and one 10-gross-ton acid and four 18-gross-ton basic) with an annual capacity of 79,000 gross tons of ingots, and 3 trains of rolls (one 30, one 31, and one 34-inch); product, steel plate, bar steel, forgings, and castings; annual capacity, 50,000 gross tons of rolled products, 15,000 tons of forged products, and 3,700 tons of castings. Two 5-gross-ton converters for the production of Bessemer steel added in 1884 and first blow made August 5, 1884; product, steel for wire rods; annual capacity, 120,000 gross tons of ingots. Fuel, coal and producer gas. Brand, "Otis." George Bartol, General Manager; J. T. Smith, Jeremiah Head, and J. E. Touch, Directors; A. P. Head, Secretary. Selling agents, Thorpe, Platt & Co., 97-103 Cedar st., New York; H. F. Deverell, Old Colony Building, Chicago; Andrew Warren Railway Supply Company, St. Louis; Austin P. Brown, Washington.

Shelby Steel Tube Company, general office, American Trust Building, Cleveland. Toledo Works, (Factory F.,) at Toledo, Lucas county; built in 1896 and put in operation in May, 1896; 2 heating furnaces, 2 trains of rolls, (12 and 14-inch,) and two 50-lb. hammers; product, blanks for the manufacture of seamless drawn steel tubes, trolley poles, etc.; annual capacity, 5,000 gross tons of blanks and 2,000,000 feet of seamless tubing and other drawn products. Fuel, petroleum (Rockwell system) and coal. E. W. Gage, Superintendent. (Formerly operated by the Brewer Seamless Tubing Company.) The company also operates another plant at Toledo, (Factory D.,) with an annual capacity of 3,000,000 feet of seamless drawn steel tubes, but which is not equipped with trains of rolls; E. W. Gage, Superintendent. *For a list of sales offices and full list of officers see Shelby Steel Tube Company, Interior Counties District, Ohio. See also Western Pennsylvania.*

Toledo (The) Rolling Mill Company, Toledo, Lucas county. Works at East Toledo. Built in 1883-4, burned April 10, 1887, and rebuilt in 1887-8; 5 single and 9 double puddling furnaces, 10 heating furnaces, one 8, one 10, and six 18-inch hot mills, one 18-inch cold mill, and one 5-ton hammer; product, extra quality assorted merchant bar, band, shafting, and sheet iron and steel; annual capacity, 40,000 gross tons. Fuel, coal. Brand, "T. R. M. Co." (Formerly called the Maumee Rolling Mill.) A. W. Houston, President, Treasurer, and Manager.

Union Rolling Mill Company, Cleveland, Cuyahoga county. Works and office at Newburgh, in the city of Cleveland. Built in 1866-7;

12 single and 3 double puddling furnaces, 5 heating furnaces with Siemens gas producers, 4 trains of rolls, (8 and 9-inch guide, 18-inch bar, and 3-high muck,) and one squeezer; product, nut, bolt, bridge, and rivet iron, soft steel bars, bar iron, and shafting; specialties, "Union Refined" bar and cold-straightened shafting; daily capacity, 125 gross tons of finished iron. Fuel, coal and manufactured gas. S. W. Sessions, President; A. S. Upson, Vice-President; H. A. Fuller, General Manager, Secretary, and Treasurer. Selling agents, The Bourne-Fuller Company, Cleveland. *See Emma Furnace, Lake Counties District, Ohio.*

Number of rolling mills and steel works in the Lake Counties: 15. Of these 3 make Bessemer steel and 4 make open-hearth steel.

MAHONING VALLEY.

Brown Bonnell (The) Iron Company, Youngstown, Mahoning county. Built in 1846; 48 double and 8 single puddling furnaces, 3 gas and 15 coal heating furnaces, 2 annealing furnaces, 4 spike and 2 washer machines, and 13 trains of rolls (three 20 and one 24-inch muck, and two 8, two 10, one 12, one 18, two 20, and one 24-inch finishing); product, bars, beams, channels, angles, universal mill plates, angle splices, railroad and boat spikes, links and pins, washers, sheets, and plates; annual capacity, 100,000 gross tons. Fuel, coal and producer gas. Brand, "Brown Bonnell." (Formerly called the Mahoning Iron Works. Cut-nail factory abandoned.) Robert McCurdy, Vice-President; J. F. Taylor, Secretary and Treasurer; J. M. Butler, Assistant Secretary; John I. Williams, General Manager. Selling agent, Charles H. Hawkins, Western Union Building, Chicago. *See Phoenix Furnace, Mahoning Valley District, Ohio.*

Cherry Valley Iron Works, Leetonia, Columbiana county. Built in 1871; 2 double and 14 single puddling furnaces, one scrap furnace, 3 heating furnaces, and 3 trains of rolls (8, 16, and 18-inch); product, muck bar and merchant bars; annual capacity, 25,000 gross tons. Fuel, coal. Brand, "Cherry Valley." (Formerly called the Leetonia Iron and Coal Company.) C. N. Schmick, President and Treasurer; W. H. Potter, Vice-President; S. E. Welker, Secretary and General Manager. *See Cherry Valley Furnace, Mahoning Valley District, Ohio.*

Coleman (The) Shields Company, Niles, Trumbull county. Built in 1841; 22 single puddling furnaces, 3 heating furnaces, and 2 trains of rolls (20-inch muck and 24-inch plate); product, pipe casing and tube iron; annual capacity, 11,000 gross tons. Fuel, coal. Henry B. Shields, President; J. Morgan Coleman, Vice-President; James D. Shields, Secretary and Treasurer.

Falcon Iron and Nail Company, Niles, Trumbull county. Two mills: Falcon Iron and Nail Works, built in 1867; 15 single and 2 double

- puddling furnaces, 13 heating furnaces, 1 scrap furnace, 8 box annealing furnaces, and 6 trains of rolls, (one 21, three 22, and two 24-inch.) Russia Sheet Iron Mills, built in 1864; 22 single and 2 double puddling furnaces, 4 heating furnaces, 4 box annealing furnaces, and 3 trains of rolls, (two 21 and one 22-inch.) Product, iron and steel skelp, sheet iron, and sheet steel; annual capacity, 27,000 gross tons of skelp and 16,500 tons of sheet iron, sheet steel, and galvanized sheets. Fuel, bituminous coal and slack. Warner Arms, President; Tod Ford, Vice-President; W. DeP. Knowlton, Secretary; Myron I. Arms, Treasurer; Edward C. Brainard, General Sales Agent, Chicago; W. H. Foster, Eastern Representative, New York.
- Falcon Tin Plate and Sheet Company, Niles, Trumbull county. Built in 1892-3 and first put in operation in April, 1893; 12 heating furnaces, (6 pair and 6 sheet,) and seven 2-high 24-inch hot and eight 2-high 22-inch cold mills; product, black plates for tinning; annual capacity, 13,000 gross tons. Fuel, bituminous coal and slack. Warner Arms, President; Tod Ford, Vice-President; W. DeP. Knowlton, Secretary; Myron I. Arms, Treasurer; William E. Harris, Superintendent; Edward C. Brainard, General Sales Agent, Chicago; W. H. Foster, Eastern Representative, New York. *See Timplat Works in Ohio.*
- Falls Hollow Staybolt Company, Cuyahoga Falls, Summit county. Co-partnership, consisting of M. H. Howe, C. M. Walsh, and J. W. Walsh. Built in 1865; rebuilt in 1884; 2 heating furnaces and one 10-inch train of rolls; product, safety hollow and solid staybolts made from the best quality of charcoal iron; annual capacity, 800 gross tons. Fuel, crude oil. Brands, "Falls Hollow Staybolt Iron" and "Falls Solid Staybolt Iron." Selling agents, John W. Walsh and C. M. Walsh, Cuyahoga Falls; J. & H. Taylor, Montreal, Canada.
- Haselton Iron Works, The Andrews Brothers Company, Youngstown, Mahoning county. Built at Niles, Trumbull county, in 1872 and removed to Haselton, a suburb of Youngstown, in 1880-1; 11 double and 22 single puddling furnaces, 10 heating furnaces, and 5 trains of rolls (one 8, one 10, one 16, and two 22-inch); product, bar, plate, sheet, rod, skelp, and band iron and steel; annual capacity, 45,000 gross tons. Fuel, coal and slack. Brand, "Haselton." L. E. Cochran, President and General Manager; Mrs. C. H. Andrews, Vice-President; H. W. Heedy, Secretary and Treasurer. Western office, New York Life Insurance Building, Chicago, John McLaughlan, Manager; Eastern office, 488 Ellicott Square, Buffalo, New York, W. S. Johnston, Manager. *See Furnaces in the Mahoning Valley District, Ohio.*
- Mahoning Valley Works, The Mahoning Valley Iron Company, Youngstown, Mahoning county. Built in 1871; 3 single and 30 double puddling furnaces, 7 coal and 6 gas heating furnaces, 7 trains of finishing rolls, and 55 cut-nail machines; product, merchant bar iron, angles, tank, and plate iron, and steel cut nails; annual capacity, 65,000

gross tons of rolled products and 180,000 kegs of nails; also makes "Acme" polished shafting; daily capacity, 18 gross tons. Fuel, bituminous coal. Brands, "M. V. I." for shafting, "I. X. L." for horse-shoe bars, "B. Q." for bridge iron, and "M. S. B." for staybolt iron. (Hubbard Works, at Hubbard, Trumbull county, dismantled in 1898.) Geo. D. Wick, President; Edmund L. Brown, Vice-President; Harry Bonnell, Secretary; William F. Bonnell, Treasurer. *See Hannah Furnace, Mahoning Valley District, Ohio.*

Ohio (The) Steel Company, Youngstown, Mahoning county. Built in 1893-4; two 10-gross-ton acid Bessemer converters; first steel made February 4, 1895; four 4-hole soaking pits, 4 trains of rolls, (one 34-inch blooming and three 24-inch roughing and finishing,) and one 1,500-lb. hammer; product, sheet and tinplate bars, slabs, billets to 1½ inches square, and T rails; annual capacity, 500,000 gross tons of ingots or 450,000 tons of rolled products. Fuel, coal. Contemplates erecting several basic open-hearth steel furnaces. Henry Wick, President; J. G. Butler, Jr., Vice-President; William H. Baldwin, Secretary; Thomas McDonald, Superintendent. *See Projected Blast Furnaces in Ohio, Mahoning Valley District.*

Struthers (The) Iron and Steel Company, Struthers, Mahoning county. Built in 1881-2 and entirely rebuilt in 1895; 4 double puddling furnaces, 2 large scrap furnaces, 2 pair furnaces, 2 sheet furnaces, 4 large box annealing furnaces, one sheet bar furnace, and 4 trains of rolls (three 24 x 40-inch hot and one 22 x 38-inch cold); product, muck and scrap bar and all sizes of iron and steel sheets; annual capacity, 5,000 gross tons of muck and scrap bar and 6,500 tons of sheets. Fuel, coal and coke. Brand, "Struthers." (Formerly called the Summers Iron Works.) A galvanizing plant is connected with the works. J. Warner, President.

Union (The) Iron and Steel Company, Youngstown, Mahoning county. (Successor to the Youngstown Iron and Steel Company and Cartwright, McCurdy & Co.) Four mills, two in Trumbull county and two in Mahoning county: Girard Mill, at Girard, Trumbull county, built in 1872 and put in operation September 1, 1873; 23 single and 2 double puddling furnaces, 3 regenerative gas heating furnaces, and 4 trains of rolls (20-inch muck and 7, 8, and 10-inch finishing); product, all sizes of bar iron and small T rails; special attention given to the manufacture of iron for chains, bolts, nuts, and agricultural implements; annual capacity, 23,000 gross tons. Warren Mill, at Warren, Trumbull county, built in 1870, burned in 1878, and rebuilt in 1879; 20 single and 4 double puddling furnaces, 2 regenerative gas and 3 coal heating furnaces, and 3 trains of rolls (20-inch muck and 10 and 20-inch finishing); product, bar and skelp iron, shafting, etc.; annual capacity, 32,000 gross tons. Upper Mill, at Youngstown, Mahoning county, built in 1871 and burned and rebuilt in 1877; 27

single puddling furnaces, 4 gas heating and 2 coal heating furnaces, 4 tire-straightening machines, and 6 trains of rolls (20-inch muck, and one 7, one 8, two 10, and one 12-inch finishing); product, bar, hoop, band, hame, box, tongue-cap, and tire iron and steel, angles, special shapes, and cotton-ties; annual capacity, 40,000 gross tons. Adding one 7 and one 8-inch continuous train of rolls. Lower Mill, at Youngstown, Mahoning county, built in 1863, 1874, and 1890; 10 single and 18 double puddling furnaces, 10 heating furnaces, (3 using producer gas,) and 10 trains of rolls (3 muck, and one 6, one 7, three 8, one 10, and one 16-inch finishing); product, hoops, bands, horseshoe iron, bar iron, guide iron, shapes, and steel cotton-ties; annual capacity, 55,000 gross tons; brand, "Eagle." Total annual capacity of the four works, 150,000 gross tons. Fuel, coal in all the works. Myron C. Wick, President; John C. Wick, Vice-President; William E. Taylor, Secretary and Treasurer. Sales offices, No. 277 Broadway, Room 32, New York; 430 Rookery Building, Chicago; 200 American Central Building, St. Louis.

Youngstown (The) Steel Company, Youngstown, Mahoning county. Built in 1883 and put in operation in May, 1884; one 10-ton Pernot revolving furnace for dephosphorizing metal by the Krupp-Bell process; product, washed metal; annual capacity of washed metal, 40,500 gross tons. Fuel, producer gas. (One 20-gross-ton Siemens acid open-hearth steel furnace abandoned.) Tod Ford, President; Paul Jones, Vice-President; John Stambaugh, Jr., Secretary and Treasurer; E. L. Ford, General Superintendent. *See Tod Furnace in Ohio, Mahoning Valley District.*

Number of rolling mills and steel works in the Mahoning Valley: 16. Of these 1 makes Bessemer steel and 1 open-hearth steel plant is projected.

INTERIOR COUNTIES.

Alliance Works, The American Steel Casting Company, Thurlow, Pa. Works at Alliance, Stark county. Built in 1883 and since enlarged; one 6-gross-ton and three 15-gross-ton acid open-hearth steel furnaces; product, steel castings; annual capacity, 12,000 gross tons. Fuel, coal. (Formerly operated by The Solid Steel Company. One small experimental Bessemer converter abandoned.) Stewart Johnston, Superintendent. *For list of branch offices and full list of officers see Thurlow Works, Pennsylvania. See Syracuse Works in New York, Norristown and Thurlow Works in Eastern Pennsylvania, Pittsburgh Works in Allegheny County, and Sharon Works in Western Pennsylvania.*

Cambridge (The) Iron and Steel Company, Cambridge, Guernsey county. Built in 1889-90 and put in operation in July, 1890; one single puddling furnace, 2 scrap furnaces, 2 gas and 19 coal heating furnaces, and one 22-inch muck mill, one 24 x 48-inch and six 24 x 38-inch sheet mills, and two 22 x 48-inch cold mills; product, sheet

iron and sheet steel; annual capacity, 18,000 gross tons. Fuel, coal. Brands: for sheets, "Cambridge Iron" and "Cambridge Steel;" for galvanized sheets, "Cambridge Best." Also operates a galvanizing plant. A. Beyer, President; A. W. Brown, Vice-President and General Manager; A. J. McCullough, Secretary; J. W. Burry, Treasurer. Selling agents, E. E. Winckler, 136 Liberty st., New York; T. G. Williams, Pittsburgh.

Canton Rolling Mill Company, Canton, Stark county. Built in 1894 and first put in operation in August, 1894; 2 pair, 2 sheet, and 3 annealing furnaces, two 24 x 40-inch hot mills, and one 22 x 38 and one 22 x 42-inch cold mill; product, iron and steel black sheets for stamping, galvanizing, and roofing; annual capacity, triple turn, 5,000 gross tons. Fuel, coal and petroleum. Adding two 24-inch hot sheet mills and one roughing mill. A galvanizing plant is connected with the works. E. K. Sober, President; George W. Wilson, Vice-President; M. F. Taylor, Secretary; S. M. Anderson, Assistant Secretary; E. L. Burchfield, Treasurer; E. E. Cline, Manager; C. H. Truby, Assistant Manager.

Canton Steel Works, Canton Steel Company, Canton, Stark county. General office, corner Twenty-first and Liberty sts., Pittsburgh, Pa. Built in 1872; 12 heating furnaces, 3 welding furnaces, 5 hammers, one 12-inch and one 20-inch train of rolls, and two 10-gross-ton acid open-hearth steel furnaces; first open-hearth steel made August 17, 1875; product, tool steel, cast steel, and spring steel; annual capacity, 11,000 gross tons of ingots and 12,000 tons of rolled products. Fuel, bituminous coal. Brand, "Canton." A. French, President; R. H. Bulley, Vice-President and General Manager; D. C. Noble, Secretary and Treasurer.

Coe, Powers & Co., lessees, Findlay, Hancock county. Built in 1888 and enlarged in 1891; remodeled in 1895; one 8 and one 12-gross-ton basic open-hearth steel furnace, with an annual capacity of 12,000 gross tons of ingots, 2 heating furnaces, and 2 continuous trains of 16-inch rolls with 7 sets of rolls in each train; product, seamless steel tubing, seamless tube specialties, and steel castings; annual capacity, 12,000 gross tons. Fuel, natural gas, coal, and oil. (Formerly operated and now owned by The Kellogg Weldless Tube Company.)

Columbus Iron Works, The P. Hayden Saddlery Hardware Company, Columbus, Franklin county. Built in 1854; 2 single and 7 double puddling furnaces, 4 heating furnaces, and 5 trains of rolls (one muck, and one 8, one 10, one 12, and one 17-inch finishing); product, merchant bars, light T rails, and iron for harness and saddlery work and for all kinds of chains; annual capacity, single turn, 13,000 gross tons. Fuel, coal, producer gas, and oil gas. W. B. Hayden, President; C. H. Allen, Vice-President; A. Hayden, 2d Vice-President; C. H. Hayden, Secretary and Treasurer.

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Dennison (The) Rolling Mill Company, Dennison, Tuscarawas county. Built in 1897 and first put in operation November 10, 1897; 4 heating furnaces, 4 annealing furnaces, two 24 x 40-inch hot mills, and one cold mill; product, common cold-rolled sheets for stamping and black plates for tinning; tack plate a specialty; annual capacity, 5,000 gross tons. Fuel, bituminous coal. W. W. Irwin, President and Manager; Edward Langenbaugh, Vice-President; S. Gharky, Secretary; Jacob Shumaker, Treasurer.

Eagle (The) Crucible Steel Company, Canton, Stark county. Built in 1895; twelve 2-pot crucible steel-melting holes; first steel made April 15, 1895; one 1,500-lb. hammer; product, high-grade tool steel of all kinds, wire-drawing plates, and steel castings; annual capacity, 450 gross tons. Fuel, coke. (Formerly operated by The Crucible Steel Casting Company.) John C. Welty, President; T. K. Albaugh, Secretary; John W. Albaugh, Treasurer; Joseph Holroyd, Melting Superintendent.

King, (The) Gilbert, and Warner Company, Columbus, Franklin county. Built in 1894-5 and put in operation May 2, 1895; two 4½-gross-ton Bessemer steel converters, one soaking pit, one heating furnace, and 3 trains of rolls (one 32-inch reversing blooming, one 20-inch sheet bar, and one 24-inch small billet); product, steel slabs, billets, and sheet bars; annual capacity, 130,000 gross tons. Fuel, coal. R. M. Gilbert, President; J. H. King, Vice-President; D. W. Singleton, Secretary; T. J. Gilbert, Treasurer. *See Furnaces in Ohio, (Miscellaneous Bituminous list.)*

Lima (The) Locomotive and Machine Company, Lima, Allen county. Built in 1892 and first put in operation in October, 1892; one completed 10-gross-ton acid open-hearth steel furnace and another 10-ton furnace being built; product, steel castings; annual capacity, 6,000 gross tons. Fuel, bituminous coal. (Formerly operated by The Lima Steel Casting Company.) George H. Marsh, President; T. T. Mitchell, Vice-President; W. T. Agerter, Secretary and Treasurer; W. C. Mitchell, General Manager.

Mansfield Machine Works, Mansfield, Richland county. Built in 1895-6 and first put in operation in 1896; 6 heating and annealing furnaces and 3 trains of rolls; product, blanks consumed by the works in the manufacture of cold-drawn seamless steel tubes; annual capacity, 1,000 gross tons of blanks and 5,000,000 feet of tubes. Fuel, coal. W. M. Sturges, President; J. S. Hedges, Vice-President; A. A. Peck, Secretary and Treasurer; N. Abbott, Superintendent.

Massillon Rolling Mill, The Corns Iron and Steel Company, Massillon, Stark county. Built in 1873 and put in operation January 4, 1875; 4 single puddling furnaces, 4 scrap furnaces, one regenerative gas heating furnace, and one 9-inch and one 18-inch train of rolls; product, best common and refined bar iron; specialties, shapes to pattern

and iron for agricultural implements; annual capacity, 9,000 gross tons. Fuel, bituminous coal and manufactured gas. (Formerly operated by Joseph Corns & Son.) James C. Corns, President and General Manager; Joseph C. Adams, Secretary.

Morton (The) Tin Plate Company, Cambridge, Guernsey county. Built in 1894 and first put in operation January 1, 1895; 6 heating furnaces, 3 annealing furnaces, three 24 x 32-inch hot mills, and four 20 x 32-inch cold mills; product, fine sheet steel for tinning; annual capacity, 6,000 gross tons. Fuel, bituminous coal and natural gas. Brand, "Morton." May add two hot mills. Charles L. Campbell, President and Treasurer; John C. Beckett, Vice-President and Secretary. Sales made by the company. *See Tinplate Works in Ohio.*

Newark Weldless Tube and Steel Company, Newark, Licking county. Built in 1897 and first put in operation in January, 1898; 1 reverberatory heating furnace, 1 annealing furnace, one 3-high 18 x 48-inch hot train of rolls, and three 18 x 48-inch cold trains (one 2-high and two 3-high); adding one 12 x 36-inch cold rolling train; product, weldless tubes of steel, steel and copper, brass, aluminum, etc., and lead lined and copper or brass lined steel tubes for bicycles, horseless carriages, steam boilers, etc.; also nickel-plated steel tubes for railing, metallic bedsteads, etc.; also oil-well working barrels, steel hollow shafting, etc.; annual capacity, 2,500 gross tons. Fuel, bituminous coal and natural gas. May add a basic open-hearth steel furnace, a universal reversible tube mill for rolling steel tubes direct from the ingot without weld or seam, and a sheet mill. S. B. Bishop, President, Pittsburgh; William E. Miller, 1st Vice-President, George H. Everson, 2d Vice-President and Manager, John H. McCune, Secretary, and James F. Lingafelter, Treasurer, Newark.

New Philadelphia (The) Iron and Steel Company, New Philadelphia, Tuscarawas county. Built in 1883; 2 double and 10 single puddling furnaces, one gas and 7 coal heating furnaces, 2 muck mills, one 48-inch and five 38-inch sheet mills, and one 50-inch cold mill; product, common and refined sheet iron and sheet steel; annual capacity, 15,000 gross tons. Fuel, coal and coke. Brands, "The N. P. I. & S. Co." and the letters N P in a diamond. A galvanizing plant is connected with the works. George Reeves, President; A. G. Reeves, Secretary and Treasurer. Selling agents, J. Garner Wright, 933-4 Monadnock Building, Chicago; Edward C. Schweitzer, home office; Baldwin & McInnes, Philadelphia.

Ohio Iron Company, Zanesville, Muskingum county. The first mill of these works was built in 1848; present company was organized in 1857 and has operated the works since then; now comprise one double and 19 single puddling furnaces, one scrap furnace, 3 coal and 3 gas heating furnaces, one re-heating furnace, one hammer, and 5 trains of rolls (two 8, one 10, one 16, and one 20-inch); one 10-gross-ton

acid open-hearth steel furnace, completed in 1886; product, assorted iron and steel merchant bars and light iron and steel T rails; specialty, agricultural irons; annual capacity, 18,000 gross tons. Fuel, coal and manufactured gas. Brand, "Ohio Iron Co." (Formerly called the Zanesville Iron Works.) E. B. Greene, President; C. D. Greene, Secretary and Treasurer. *See Furnaces in the Miscellaneous Bituminous list in Ohio.*

Piqua (The) Rolling Mill Company, Piqua, Miami county. Built in 1889; 6 single puddling furnaces, 2 sheet bar heating furnaces, 4 combined pair and softening furnaces, 5 annealing furnaces, and one 3-high 22-inch bar and 2 stands of sheet roughing rolls, four 24-inch hot sheet mills, and one cold sheet mill; product, iron and steel sheets; annual capacity, 8,000 gross tons. Fuel, coal and crude oil. Brand, "Piqua." J. G. Battelle, President and General Manager; W. P. Orr, Vice-President; James Hicks, Secretary and Treasurer; W. H. Bailey, Superintendent. Selling agent, The Cincinnati Corrugating Company, Piqua.

Reeves (The) Iron Company, Canal Dover, Tuscarawas county. Built in 1865-6 and enlarged in 1895; first iron rolled in February, 1866; 20 single puddling furnaces, 3 coal and 2 gas heating furnaces, one 3-high 20-inch muck mill, one 8, one 10, and one 20-inch finishing mill, 6 sheet mills, and 2 cold rolling mills; also a complete galvanizing and pickling plant; product, merchant bar iron and steel, light T rails, and black and galvanized and cold-rolled sheet iron and sheet steel; annual capacity, 40,000 gross tons; (formerly called the Dover Rolling Mill.) New mill added in 1895; three 24 x 32-inch black plate mills, three 24 x 38-inch sheet mills, and four 24 x 32-inch cold mills; product, black plates for tinning and sheet iron and steel; annual capacity, 13,500 gross tons. Fuel, coal. Jeremiah Reeves, President and General Manager; Alexander Fraser, Vice-President; P. S. Cooper, Secretary; S. J. Reeves, Treasurer; James Rees, Superintendent.

Shelby Steel Tube Company, general office, American Trust Building, Cleveland. Formed by the consolidation in November, 1897, of The Shelby Steel Tube Company, of Shelby, Ohio; the Ellwood Weldless Tube Company, of Ellwood City, Pa.; the Greenville Tube Company, of Greenville, Pa.; and the American Weldless Tube Company and the Brewer Tube Company, of Toledo, Ohio. Shelby Works, (Factory A.,) at Shelby, Richland county; built in 1890 and first put in operation in July, 1891; 4 Swindell heating furnaces and 9 hot mills (one 10, four 12, and four 20-inch); product, blanks for the manufacture of seamless drawn steel tubes; annual capacity, 6,000 gross tons of blanks and 24,000,000 feet of seamless drawn steel tubes. Fuel, coal and oil. A. C. Morse, Superintendent; William Thornburgh, General Manager of Operating Department. William E. Miller, President, Elyria, Ohio; W. S. Miller, Treasurer, and H. H. Cockley, Secretary,

Shelby, Ohio. Selling agents, E. K. Orr, 135 Lake st., Chicago; L. B. Thornburgh, 144 Chambers st., New York City; E. Bocker, 29 Constitution Hill, Birmingham, England. *See Shelby Steel Tube Company, Western Pennsylvania, and Lake Counties District, Ohio.*

Number of rolling mills and steel works in the Interior Counties: 19.

Of these 1 makes Bessemer steel, 5 make open-hearth steel and 1 open-hearth steel plant is projected, and 1 makes crucible steel.

OHIO RIVER COUNTIES.

Ætna-Standard Iron and Steel Company, Bridgeport, Belmont county. Five works: Three works at Bridgeport, Belmont county, and two works at Mingo Junction, Jefferson county. Ætna Works, at Bridgeport, built in 1873 and put in operation January 1, 1874; enlarged in 1883 and 1891; 1 reverberatory and 4 regenerative gas heating furnaces, 6 sheet mill softening, 4 sheet mill pair, and 6 box annealing furnaces, and 11 trains of hot rolls (one 20-inch muck, one 16-inch bar, and one 8 and one 9-inch guide, all 3-high; one 21, two 24, and two 26-inch sheet; and two 24-inch black plate, the latter equipped with 2 pair heating and 2 softening furnaces and 3 stands of cold rolls); product, steel bars, sheets, plates, bands, light T rails, angles, tees, channels, and miscellaneous shapes; annual capacity, 50,000 gross tons; brand, "Ætna;" (formerly operated by the Ætna Iron and Steel Company.) Standard Sheet Mill Works, at Bridgeport, built in 1882-3 and put in operation April 1, 1883; remodeled in 1888 and 1892; 7 pair heating furnaces, 7 softening furnaces, 7 single and 3 double annealing furnaces, 7 trains of finishing rolls, (one 22, one 23, four 24, and one 26-inch,) and one stand of cold rolls; product, black plates, steel sheets, galvanized iron, corrugated iron, and other forms of roofing iron; annual capacity, 14,000 gross tons; brand, "Standard;" (formerly operated by The Standard Iron Company.) Standard Black Plate Mills, at Bridgeport, formerly operated by The Standard Iron Company as a sheet mill; 4 pair heating, 4 softening, and 1 single and 2 double annealing furnaces, four 24-inch black plate hot mills, and five 22-inch cold mills; product, black plates for tinning; annual capacity, 7,200 gross tons. Fuel used in the three works described above, natural gas, producer gas, and coal. Junction Works, at Mingo Junction, (two works,) formed by the consolidation of the Junction Iron Company and the Laughlin and Junction Steel Company in September, 1894; original plant (formerly operated by the Junction Iron Company) built in 1882 and put in operation November 1, 1882; remodeled in 1895; now consists of 2 gas heating furnaces, one 3-high 20-inch mill, and one continuous and Belgian mill; product, merchant steel bars; annual capacity, 40,000 gross tons; (cut-nail factory, containing 142 nail machines and a nail plate train, abandoned in 1895.) Steel department (formerly operated by the

Laughlin and Junction Steel Company) built in 1885-6; two 5-gross-ton Bessemer converters; first blow made February 8, 1886; one 5-hole soaking pit and a blooming mill; product, blooms, slabs, and billets; annual capacity, 120,000 gross tons. The steel department is being modernized, and is to contain two 10-gross-ton Bessemer converters, complete new blooming mill, labor-saving appliances, etc.; will be in operation in July or August, 1898, and will have an annual capacity of from 300,000 to 400,000 gross tons of slabs and billets. An open-hearth steel plant may also be added. When the improvements in the steel department are completed the two 5-gross-ton Bessemer steel converters will be abandoned. Fuel at the Junction Works, coal and producer gas. (The Junction Works were consolidated with the works of the Aetna-Standard Iron and Steel Company on July 1, 1897.) W. T. Graham, President; John A. Topping, Secretary; J. J. Holloway, Treasurer; B. M. Caldwell, General Manager. *See Furnaces in the Miscellaneous Bituminous list in Ohio. See Tinplate Works in Ohio.*

Beaver (The) Tin Plate Company, Lisbon, Columbiana county. Built in 1894-5 and first put in operation April 10, 1895; 6 sheet, 6 pair, and 4 double annealing furnaces, and six 24 x 32-inch hot and five 22 x 34-inch cold mills; product, black plates for tinning and light sheets of No. 38 gauge and under; annual capacity, 10,000 gross tons. Fuel, bituminous coal. C. W. Bray, President; I. M. Scott, Secretary and Treasurer; George D. Evans, Superintendent. Sales made by the company. *See Tinplate Works in Ohio.*

Belfont Iron Works, Belfont Iron Works Company, Ironton, Lawrence county. Built in 1852; 21 single puddling furnaces, 4 gas heating furnaces, 2 trains of rolls, and 126 cut-nail machines; product, nails of iron and steel and of combined iron and steel; annual capacity, 300,000 kegs. Fuel, bituminous coal. Brand, "Belfont." John G. Peebles, President; B. H. Burr, Vice-President and General Manager; S. G. Gilfillan, Secretary and Treasurer. *See Belfont Furnace, Hanging Rock District in Ohio, (Bituminous list.)*

Bellaire Steel Company, Bellaire, Belmont county. Rolling mill built in 1867 and put in operation in February, 1868; remodeled in 1893 and rebuilt in 1895; 3 trains of 24-inch rolls, with five driven roller and chain transfer tables; product, sheet and tinplate bars, skelp steel, bridge plates, etc.; annual capacity, 200,000 gross tons. (Cut-nail factory containing 125 cut-nail machines abandoned.) Bessemer steel works built in 1883-4 and rebuilt in 1897; two 10-gross-ton converters, 3 soaking pits, and a blooming mill; first blow made April 28, 1884; product, soft steel blooms, billets, and slabs; annual capacity, 200,000 gross tons. Fuel, natural gas and coal. (Name changed from Bellaire Nail Works to Bellaire Steel Company in February, 1896.) J. R. McCortney, President; A. B. Carter, Secre-

tary and Treasurer. *See Bellaire Furnaces in the Miscellaneous Bituminous list in Ohio.*

Burgess Steel and Iron Works, Portsmouth, Scioto county. Built in 1871; 3 single puddling furnaces, 13 heating furnaces, one 24-pot crucible steel-melting furnace, with an annual capacity of 1,500 gross tons of ingots; one 40-ton acid and two 25-gross-ton basic open-hearth steel furnaces, with an annual capacity of 50,000 tons of ingots; 7 trains of rolls, (two 20-inch jobbing sheet mills, one 28-inch blooming mill, one 24-inch plate mill, and one 8, one 18, and one 20-inch cold mill,) and 2 steam hammers; product, plow steel, (open-hearth, puddled, German, and iron-centre crucible cast,) tool steel, steel and iron boiler plate, angles, "U. S. Norway" refined iron, blooms, five-ply safe steel, and spring, tire, and machinery steel; annual capacity, 40,000 gross tons. Fuel, coal and producer gas. (Portsmouth Iron and Steel Works, built in 1832, dismantled in 1892.) L. D. York, President and Superintendent; John E. Jones, Vice-President; B. F. Vincent, Secretary and Treasurer. Selling agents, J. L. Adams & Co., Cincinnati; G. W. Weyer, St. Louis.

Cincinnati Rolling Mill and Tin Plate Company, 298 East Pearl street, Cincinnati. Works at Riverside, Hamilton county. Built in 1880 and enlarged in 1882; remodeled by the Cincinnati Rolling Mill Company in 1892; converted into a black plate mill in 1897; 4 heating furnaces, 4 double annealing furnaces, 4 hot mills, (three 24 x 32 and one 24 x 34-inch,) and 3 stands of 22 x 38-inch cold rolls; product, black plates for tinning; annual capacity, triple turn, 7,200 gross tons. Fuel, coal. Expects to add another hot mill. (Formerly operated by the Cincinnati Rolling Mill Company.) W. T. Simpson, President; James N. Gamble, Vice-President; C. D. Robertson, Secretary; S. M. Goodman, Treasurer; J. B. Baird, Manager. Selling agents, W. T. Simpson & Co., Cincinnati. *See Tinplate Works in Ohio.*

Irondale Rolling Mill, Wallace, Banfield & Co., Irondale, Jefferson county. Branch office, 246 Third ave., Pittsburgh, Pa. Works, which were originally built by the Pioneer Iron Company in 1868, then consisted of a blast furnace, a rolling mill, a galvanizing plant, and a square mile of coal property; bought and refitted by present owners, who erected two sheet mills in 1884; one puddling furnace, 2 heating furnaces, one scrap furnace, 8 sheet furnaces, 4 annealing furnaces, one bar mill, four 24-inch sheet mills, and 3 cold mills; product, black plates for tinning; annual capacity, triple turn, 8,000 gross tons. Fuel, coal. *See Tinplate Works in Ohio, (Irondale Tin and Terne Plate Works.)*

Iron-ton Rolling Mill, The Eagle Iron and Steel Company, Iron-ton, Lawrence county. Built in 1852 and enlarged several times since; 16 single and 3 double puddling furnaces, 2 gas furnaces for bar and guide mills, 2 pair and 2 heating furnaces for sheet mills, 1 scrap and 2 annealing furnaces, and 5 trains of rolls (one 18-inch muck, one

3-high 16-inch bar, one 9-inch guide, and two 22 x 38-inch sheet); product, bar and sheet iron and steel and 8 to 16-lb. rails; annual capacity, 25,000 gross tons. Fuel, producer gas and bituminous coal. H. A. Marting, President and General Manager; S. B. Steece, Vice-President; H. H. Mittendorf, Secretary and Treasurer; George F. Thomas and Thomas W. Hughes, Assistant Managers. Selling agents, Wolfe & Good, St. Louis.

Jefferson Iron Works, S. K. Wallace, Receiver, Steubenville, Jefferson county. Built in 1855; 3 gas heating furnaces, one 21-inch train of plate rolls, and 128 cut-nail machines; product, skelp iron and steel, sheet bars, and steel nails; annual capacity, 20,000 gross tons of rolled products or 400,000 kegs of nails. Fuel, manufactured gas and coal. Brand, "Jefferson." S. K. Wallace, President; W. H. McClinton, Vice-President and General Manager; G. P. Harden, Secretary.

Kelly Nail Works, Kelly Nail and Iron Company, Ironton, Lawrence county. Built in 1883 and first put in operation November 1, 1883; 14 single puddling furnaces, 2 gas heating furnaces, 2 forge fires, 2 trains of rolls, (one 18-inch muck and one 2-high 22-inch plate,) and 120 cut-nail machines; product, muck bar and iron and steel cut nails and spikes; annual capacity, 15,000 gross tons of muck bar and 250,000 kegs of nails. Fuel, coal. Brand, "The Ironton Nail." Charles Parrott, President; Ironton A. Kelly, Vice-President; Oscar Richey, Secretary and Treasurer. *See Sarah Furnace, Hanging Rock District in Ohio (Bituminous list.)*

Laughlin Nail Company, Wheeling, W. Va. Works at Martin's Ferry, Belmont county, Ohio. Nail factory built in 1872-3; first keg of nails made March 4, 1873; works destroyed by fire August 8, 1881, but immediately rebuilt; 3 gas heating furnaces, one train of rolls, one hammer, and 225 cut-nail machines; product, steel cut nails and spikes; annual capacity, 625,000 kegs. Black plate mills added to nail factory in 1895; 14 heating furnaces, 8 annealing furnaces, 14 pair furnaces, and 14 hot and 12 cold mills; product, black plates for tinning; annual capacity, 28,000 gross tons. Fuel, coal. Brand, "Laughlin." W. L. Glessner, President; F. M. Strong, Secretary; George G. Spencer, Salesman, Rookery Building, Chicago. *See Tinplate Works in Ohio.*

Pomeroy Mill, The Pomeroy Iron and Steel Company, Hayden Building, Columbus. Works at Pomeroy, Meigs county. Built in 1847; 12 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls (one muck, and one 7, one 8, and one 12-inch finishing); product, refined iron and soft steel bars, bands, hoops, horseshoe bars, and cotton-ties; annual capacity, 20,000 gross tons. Fuel, coal. George D. Wick, President; W. A. Kingsley, Secretary and Treasurer.

Wellsville Plate and Sheet Iron Company, Wellsville, Columbiana county. Mill built in 1873 to make tinplates; remodeled in 1880

by present owners; 2 single puddling furnaces, 2 heating furnaces, 9 pair and sheet and 9 annealing furnaces, one squeezer, one bar mill, 4 roughing mills, 4 hot sheet mills, and 4 cold mills; product, plate and sheet iron and steel and black plates for tinning; annual capacity, 10,000 gross tons. Fuel, coal. Persifor F. Smith, President and Manager; R. G. Wood, Vice-President; Alan W. Wood, Treasurer; D. S. Brookman, Secretary.

Number of rolling mills and steel works in the Ohio River Counties:

17. Of these 2 make Bessemer steel, 1 makes open-hearth steel and 1 open-hearth steel plant is projected, and 1 makes crucible steel.

Total number of rolling mills and steel works in Ohio: 67. Of these 7 make Bessemer steel, 10 have open-hearth steel plants and 3 open-hearth steel plants are projected, and 2 make crucible steel.

INDIANA.

Albany Manufacturing Company, Albany, Delaware county. Tube works built in 1896; rolling mill, now being added, will contain 1 heating furnace and 1 train of rolls; product, blanks, to be consumed by the company in the manufacture of cold-drawn seamless steel tubes; estimated annual capacity, 700 gross tons of blanks and 5,000,000 feet of seamless tubes. Fuel, natural gas. Charles F. Smith, President; Philip Goetz, Secretary; J. B. Bright, Treasurer and Manager. American (The) Tin Plate Company, Elwood, Madison county. Two works: Elwood Works, built in 1891-2 and first put in operation in June, 1892; 40 heating furnaces, 15 annealing furnaces, and 20 hot and 20 cold mills; product, black plates for tin and terne plates, all consumed by the company in its tinplate works; annual capacity, triple turn, 65,000 gross tons; fuel, natural gas exclusively. Montpelier Works, Montpelier, Blackford county, built in 1894 and first put in operation in May, 1895; 6 heating furnaces, 2 annealing furnaces, and 6 hot and 4 cold mills; product, black plates for tinning; annual capacity, triple turn, 13,000 gross tons; fuel, natural gas; (formerly operated by The Montpelier Sheet and Tin Plate Company.) Contemplates erecting an open-hearth steel plant at Elwood. W. B. Leeds, President; John F. Hazen, Vice-President; L. H. Landon, Secretary; D. G. Reid, Treasurer. Sales made by the company at 1118 Marquette Building, Chicago. *See Tinplate Works in Indiana.*

Anderson Works, American Steel and Wire Company, general office, Rookery Building, Chicago. Works at Anderson, Madison county. Built in 1889 by the American Wire Nail Company; 2 continuous heating furnaces, one rod mill, and 175 wire-nail machines; product, steel wire rods, wire, and wire nails; annual capacity, 75,000 gross tons of rods, 70,000 tons of wire, and 840,000 kegs of nails. Fuel, natural gas. (Formerly operated by the American Wire Nail Company.) F. C. Gedge, Manager. *See Allentown Works in Eastern Penn-*

sylvania for a full list of officers, branch offices, and selling agents. See also Pittsburgh Works in Allegheny County, Beaver Falls Works in Western Pennsylvania, and American Steel and Wire Company in Ohio, (Lake Counties District.)

Atlanta (The) Steel and Tin Plate Company, Atlanta, Hamilton county. Built in 1894-5 and put in operation in March, 1895; 13 heating furnaces, 3 annealing furnaces, five hot mills, and four cold mills; product, black plates for tinning and light gauge sheets up to No. 34 gauge and in sizes up to 30 x 96 inches; annual capacity, 13,500 gross tons. Fuel, natural gas exclusively. Brand, "Atlanta." C. A. Ford, President; T. D. Morgan, Vice-President and General Manager; E. S. Walton, Secretary and Treasurer. Sales made by the company. *See Tinplate Works in Indiana.*

Central (The) Iron and Steel Company, Brazil, Clay county. Built in 1882-3 and first put in operation January 12, 1883; 9 double puddling furnaces, one gas and 9 coal heating furnaces, 4 spike machines, 6 trains of rolls, (one 8, two 10, one 16, and two 20-inch,) and one 1,500-lb. and two 4-ton hammers; product, bar iron, light T rails, car axles, forgings, Acheson's patent railroad spikes, and Williams's wrought-iron open hexagonal turn-buckles; special attention given to car and bridge specifications; annual capacity, 12,000 gross tons of rolled and 3,000 tons of forged iron, 7,000 tons of spikes, and 300,000 turn-buckles. Fuel, producer gas. Brand, "Central." A bolt and nut factory is connected with the works. Major Collins, President and Manager; M. R. Collins, Secretary; J. H. Lewis, Treasurer.

Chicago Horse Shoe Company, East Chicago, Lake county. Office, 1119 Ashland Block, Chicago. Built in 1888-9; 1 large and 8 small heating furnaces, 7 bending machines, 7 planishing machines, 2 grubbing machines, and 1 train of 9-inch rolls; product, horseshoe bars and horse and mule shoes; annual capacity, single turn, 10,000 gross tons. Fuel, petroleum and coal. Adding another 9-inch train of rolls. (One 1½-gross-ton Robert-Bessemer steel converter abandoned.) John Davis, President; Henry B. Shields, Vice-President; E. E. Morrill, Treasurer; S. S. Shields, Secretary; Gideon N. Caleb, General Manager.

Corning Steel Company, Hammond, Lake county. Built in 1892 and put in operation October 17, 1892; 8 heating furnaces and 7 trains of 22-inch sheet rolls; product, steel sheets; annual capacity, 12,000 gross tons. Fuel, petroleum and coal. F. T. Corning, President; C. S. Corning, Secretary and Treasurer; Sidney McCloud, Manager. For sale.

Gas City Tinplate Works, The Morewood Company, Gas City, Grant county. Built in 1892-3 and first put in operation in December, 1893; 16 gas heating furnaces, one bar and 8 hot tin mills, and 10 pairs of cold rolls; product, black plates for tin and terne plates; annual capacity, 17,000 gross tons. Fuel, natural gas. J. H. Rogers, President; C. M. Stuart, Secretary; Louis Follet, Assistant Treasurer; C.

- Maliphaunt, Manager of Works. All sales made by the company. See *Tinplate Works in Indiana*.
- Gould Steel Company, 66 Broadway, New York City. Works at Anderson, Madison county. Built in 1891-2 and first put in operation March 28, 1892; two 15-gross-ton acid open-hearth steel furnaces; product, steel castings; annual capacity, 9,000 gross tons. Fuel, natural gas. Brand, "G. C. Co." Charles A. Gould, President; Charles M. Gould, Vice-President; William E. Kurtz, Secretary and Manager; William S. Gould, Treasurer.
- Hinson and Hurford Steel Casting Company, Monadnock Building, Chicago. Works at Converse, Miami county. One 15-gross-ton acid open-hearth steel furnace, built in 1898; product, National car couplers, National continuous platform buffers, and other steel castings; annual capacity, 7,500 gross tons. Fuel, natural gas. I. H. Hinson, President; W. D. Hurford, Secretary and Treasurer; William Chambers, Superintendent.
- Indiana Forge and Rolling Mill Company, 1242-48 Harrison ave., Cincinnati, Ohio. Chicago office, 401 Fisher Building; Dresden (Germany) office, 91 Rosenstrasse. Works at New Albany, Floyd county. Forge built in 1869; rolling mill added in October, 1887; 12 coal heating furnaces, 3 forge fires, 3 trains of rolls, (10, 18, and 21-inch,) and 6 hammers; product, car axles, shafting, forgings, and bar and structural iron; annual capacity, 9,000 gross tons of axles, 1,500 tons of forgings, and 30,000 tons of bars. Fuel, coal. May add a spike mill. Herman Joseph, Manager. Owned by Joseph Joseph & Brothers.
- Indiana (The) Iron Company, Muncie, Delaware county. Built in 1892, utilizing machinery from the Lancaster Iron Company's rolling mill at Lancaster, Ohio; first put in operation in July, 1892; 22 single puddling furnaces, 1 regenerative scrapping furnace, 5 regenerative heating furnaces, and 4 trains of rolls (one 3-high 20-inch muck, and one 8, one 10, and one 16-inch finishing); product, iron and steel bars, bolts, nuts, bridge rods, and gimlet-pointed coach screws; annual capacity, 45,000 gross tons of finished products. Fuel, natural gas. J. D. Platt, President; L. A. Cobb, Vice-President; William M. Myers, Secretary; George M. Bard, Treasurer and Manager; John L. Smith, Superintendent of Rolling Mills; John M. Stetter, Superintendent of Bolt Works.
- Indiana (The) Steel Company, Indianapolis, Marion county. Operates under lease one double and 2 single heating furnaces and the 26-inch mill in the works of the Premier Steel Company, producing beams from 6 to 20 inches; daily capacity, 100 gross tons. Fuel, natural gas and producer gas. Jacob Christopher, President; J. E. McGettigan, Vice-President; W. R. Brown, Secretary; W. V. Martin, Treasurer. Idle since May, 1893. See *Premier Steel Company in Indiana*.
- Inland Iron and Forge Company, 1227-29 Marquette Building, Chicago.

- Works at East Chicago, Lake county. Built in 1889 and put in operation September 15, 1889; 9 double puddling furnaces, 11 heating furnaces, 10 forge fires, 5 hammers, (50-lb., 80-lb., 1,500-lb., 3-ton, and 5-ton,) and 4 trains of rolls (one 18-inch muck, and one 8-inch, one 10-inch, and one 18-inch finishing); product, muck bar, bar iron, car axles, shafting, and general forgings; annual capacity, 40,000 gross tons of rolled and 6,000 tons of forged products. Fuel, natural gas and oil. (Formerly operated by the East Chicago Iron and Steel Company.) P. D. Block, President; S. J. Llewellyn, Vice-President; G. H. Jones, Secretary and Treasurer; L. E. Block, General Manager.
- Irondale (The) Steel and Iron Company, Richmond. Works at Middletown, Henry county. Built in 1893-4 utilizing machinery from the company's mill at Anderson, which was destroyed by fire on October 31, 1893; 6 pair furnaces, 6 plate heating furnaces, one 24 x 40 and five 24 x 32-inch hot mills, and one 20 x 44 and four 20 x 34-inch cold mills; product, black plates for tinning; annual capacity, 10,000 gross tons. Fuel, natural gas. Brand, "Crane." George A. Laughlin, President; O. C. Lambert, Secretary; R. M. Decker, Superintendent. *See Tinplate Works in Indiana.*
- Lakeside Nail Company, lessee, First National Bank Building, Chicago. Works at Hammond, Lake county. Built in 1886-7; 4 gas heating furnaces, 2 trains of rolls, (24-inch slab and 22-inch nail plate,) and 202 cut-nail machines; product, cut nails; annual capacity, 600,000 kegs. Fuel, coal and manufactured gas. Brand, "Lakeside." George S. Griscom, President; W. Scott Bonnell, Vice-President; T. F. Woodman, General Manager and Treasurer; Stephen Ripley, Superintendent. (Works are owned by the Chicago Steel Manufacturing Company. These works also contain two 3-gross-ton Bessemer steel converters, which are idle; first blow made November 22, 1887.)
- Marion (The) Steel and Iron Company, (incorporated,) Marion, Grant county. Built in 1893 and put in operation in September, 1893; 2 heating furnaces and one 10-inch train of rolls; product, rods, squares, flats, ovals, and hoop and band iron and steel; annual capacity, 13,500 gross tons. Fuel, natural gas. Charles A. Borts, President; Thomas Reed, Vice-President; W. C. Ely, Secretary and Treasurer.
- Midland Steel Company, Muncie, Delaware county. Built in 1892 and first put in operation October 10, 1892; one 35-gross-ton basic and one 35-gross-ton acid open-hearth steel furnace with an annual capacity of 30,000 gross tons, 5 pair furnaces, 5 sheet furnaces, 6 annealing furnaces, 6 soaking pits, one 30-inch reversing blooming mill, one 3-high bar mill, and 10 stands of rolls (five 24-inch and two 22-inch hot and three 22-inch cold); product, ingots, blooms, billets, slabs, sheet and tinplate bars, and stamping and tinning sheets; annual capacity, 30,000 gross tons of ingots, billets, and sheet and tinplate bars, and 12,000 tons of sheets and plates. Fuel, natural gas exclusively.

- R. J. Beatty, President; John A. McVoy, Vice-President; J. R. Wick, Secretary; J. G. Battelle, Treasurer.
- Muncie (The) Iron and Steel Company, Muncie, Delaware county. Built in 1893 and first put in operation in April, 1894; 4 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 20-inch muck, one 12-inch breaking down, and one 10-inch finishing); product, band and bar iron; annual capacity, 12,000 gross tons. Fuel, natural gas exclusively. J. C. Griesheimer, President; Richard McGauley, Vice-President; Edward Tuhey, Secretary and Treasurer.
- Muncie Rolling Mill, Bassett, Presley & Train, 17-31 Merwin st., Cleveland, Ohio. Works at Muncie, Delaware county. Built in 1888-9 with part of machinery removed from Greencastle; put in operation in March, 1889; 18 double puddling furnaces, 2 scrap furnaces, and two 18-inch trains of rolls; product, muck bar; annual capacity, 25,000 gross tons. Fuel, natural gas. (Formerly operated by the Florence Iron and Steel Company.) For sale or lease.
- National Steel Castings Company, Montpelier, Blackford county. Built in 1896-7; one 10-ton Siemens acid open-hearth steel furnace; product, car couplers, knuckles, and a general line of steel castings; specialty, railroad and electric castings; annual capacity, 5,000 gross tons. Fuel, natural gas. (Built by the Chicago Truck and Steel Casting Company; operated later by The Indiana Steel Castings Company.) Burt H. Whiteley, President, Muncie; Clifton F. Springer, Vice-President, Montpelier; John R. Sinclair, Secretary, Lima, Ohio; Charles S. Bash, Treasurer, Fort Wayne.
- National (The) Tin Plate Company, Anderson, Madison county. Built in 1894-5 and put in operation August 1, 1895; 6 double heating furnaces, 2 annealing furnaces, and 6 hot and 6 cold mills; product, black plates for tinning; annual capacity, triple turn, 13,000 gross tons. Fuel, natural gas. Philip Matter, President; Joseph I. Irwin, Vice-President; Frank Donner, Secretary and Manager; W. H. Donner, Treasurer. Sales made by the company. *See Tinplate Works in Indiana.*
- Ohio Falls Iron Works, New Albany, Floyd county. Built in 1866; 14 single puddling furnaces, one scrap furnace, 5 heating furnaces, and 4 trains of rolls (8 and 10-inch guide, 16-inch bar, and 18-inch muck); product, bridge, bar, plow, and staybolt iron; annual capacity, single turn, 18,000 gross tons. Fuel, coal. Newland T. DePauw, President; Walter E. Stoy, Vice-President and Treasurer. Property in the hands of George Borgeding, trustee for bondholders. Idle.
- Oliver Chilled Plow Works, South Bend Iron Works, proprietors, South Bend, St. Joseph county. Crucible steel plant built in 1891 for the production of steel solely for use in the works in the manufacture of plows; 96 pots can be used at each heat; annual capacity, 100 gross tons. Fuel, coke. James Oliver, President; George Ford, Secretary; J. D. Oliver, Treasurer.

Park Iron and Steel Works, T. F. Rose, Muncie, Delaware county.

Built in 1891-2, utilizing machinery formerly operated by the Anderson Rolling Mill Company, at Anderson; put in operation in June, 1892; 3 heating furnaces and 2 trains of rolls (one 8 and one 9-inch); product, merchant bar iron and steel; annual capacity, 15,000 gross tons. Fuel, natural gas. (Formerly operated by the Florence Iron and Steel Company.) For sale or lease.

Premier Steel Company, Indianapolis, Marion county. Built in 1857,

1881-2, 1886-7, and remodeled by the present company in 1890-1; 7 single puddling furnaces, 2 heating furnaces, 8 soaking pits, one forge fire, and one 3-high 18-inch, one 3-high 26-inch, and one 3-high blooming train of rolls. Two 15-gross-ton basic open-hearth steel furnaces; first steel made in May, 1887; annual capacity, double turn, 18,000 gross tons of ingots. Two 4-gross ton Basic-Bessemer converters, erected in 1892-3; annual capacity, double turn, 100,000 gross tons of ingots. Product, billets, angles, channels, miscellaneous shapes, and merchant bar steel; annual capacity, single turn, 18,000 gross tons. Fuel, producer and natural gas. (The 26-inch beam mill is leased by the Indiana Steel Company. One Adams direct-process furnace abandoned.) C. W. DePauw, President; N. T. DePauw, Vice-President; W. H. Coen, Secretary; Albert Trinler, Treasurer. J. E. McGettigan, Receiver. (In litigation; works idle; to be sold; date of sale uncertain.) See *The Indiana Steel Company in Indiana*.

Terre Haute Iron and Steel Company, Terre Haute, Vigo county.

Chicago office, 133-35 South Clinton st. Built in 1868; destroyed by fire September 19, 1873, and rebuilt in the winter of 1873-4; enlarged in 1883 and 1884; 5 double puddling furnaces, 16 single puddling furnaces, 2 regenerative gas heating furnaces, and 3 trains of rolls (one 19-inch muck, one 18-inch bar, and one 10-inch guide); product, bars, bands, horseshoe and refined iron, and light T rails; annual capacity, 28,000 gross tons. Fuel, block coal and manufactured gas. Brands, "Terre Haute" and "Vigo." Works also contain 64 cut-nail machines, which are idle. (Formerly owned by the Terre Haute Iron and Nail Works.) J. P. Crawford, President; A. J. Crawford, Vice-President and Treasurer; Sam L. Bridwell, Secretary; M. H. Monkhouse, Superintendent.

Union Steel Company, 415 Locust st., St. Louis, Mo. Works at Alexandria, Madison county. Built in 1893-5, using part of machinery formerly operated by the New Albany Rail Mill, at New Albany, Indiana, and the Valley Steel Company, at Belleville, Illinois; put in operation in July, 1895; 20 double puddling furnaces, 8 forge fires, 6 bar heating furnaces, 4 sheet heating furnaces, 4 pair furnaces, 2 double annealing furnaces, 2 soaking pits, and 7 trains of rolls (one 20-inch muck, one 21-inch bar, one 8, one 9, and one 12-inch guide, one 24-inch sheet with 4 finishing stands, and one 32-inch bloom-

ing); product, muck bar, bar iron and steel, railroad splices, sheet iron and steel, billets, ingots, small rails, shapes, etc.; annual capacity, 250,000 gross tons. The Bessemer steel department contains two 5-gross-ton converters, removed from the Valley Steel Company's plant at Belleville, Ill., in 1895; product, Bessemer steel ingots; annual capacity, 150,000 gross tons. Fuel, natural gas in all departments. Charles A. McNair, President, T. A. Meysenburg, Vice-President, and F. W. Oliver, Secretary and Treasurer, St. Louis; Albert Trinler, Manager, Alexandria. Selling agents, B. S. Adams, St. Louis; Hubbert & Hubbert, Chicago and Cincinnati.

Wabash Iron Company, Terre Haute, Vigo county. Chicago office, 133 South Clinton st. Completed in 1874; one double and 15 single puddling furnaces, one scrap and 3 heating furnaces, and 3 trains of rolls (8-inch guide, 18-inch bar, and 20-inch muck); product, bars, bands, horseshoe bar, light T rails, etc.; annual capacity, 22,500 gross tons. Fuel, block coal. Brands, "Wabash," "Maud S.," and "Vigo." A. J. Crawford, President; J. P. Crawford, Secretary and Treasurer.

Westerman-Stewart Iron Company, Marion, Grant county. Built in 1890-1 with machinery from the abandoned Prospect mill at Cleveland, Ohio; 4 heating furnaces and 2 trains of rolls (one 9 and one 15-inch); product, bar iron; annual capacity, 10,000 gross tons. Fuel, natural gas. Brand, "Westerman." (Formerly operated by the Westerman Natural Gas Iron Company.) Selling agents, C. H. Mecum, 639 Rookery Building, Chicago; McGilvray & Scott, 104 Laclede Building, St. Louis; Davis, Kelly & Co., Louisville; W. F. Robertson Steel and Iron Company, Cincinnati. Owned by George R. Stewart.

Wetherald Rolling Mill, Wetherald Rolling Mill Company, Frankton, Madison county. Built in 1893, utilizing machinery from the abandoned Wetherald Rolling Mill, at Findlay, Ohio; first put in operation in January, 1894; 5 scrap furnaces, 3 heating furnaces, and 3 trains of rolls (8, 10, and 18-inch); product, bar and band iron; annual capacity, 18,000 gross tons. Fuel, natural gas. A. L. Wetherald, President; A. D. Hilborn, Secretary and Treasurer; H. O. Wetherald, Manager. Selling agents, Northwestern Iron and Metal Company, Chicago.

Wright Shovel Company, Anderson, Madison county. Two works: Anderson Works, at Anderson, built in 1891 and first put in operation January 1, 1892; 10 heating furnaces and two 18-inch trains of sheet rolls; product, sheets for shovels, spades, and scoops; annual capacity, 1,800 gross tons; shovel works have 3 forge fires and 3 heating furnaces; fuel, natural gas exclusively. Greenfield Works, at Greenfield, Hancock county, built in 1889 with machinery formerly in Cobb's Iron and Nail Works at Aurora; one gas heating furnace and one 22-inch train of rolls; product, shovel plate; annual capacity, 1,800 gross tons; fuel, natural gas; (formerly operated by the

Greenfield Iron and Nail Company; nail factory connected with the works abandoned.) Thomas W. Wright, President; W. J. Alford, Secretary and Treasurer.

Number of rolling mills and steel works in Indiana: 33 completed and 1 building. Of these 3 have Bessemer steel plants, 5 have open-hearth steel plants and 1 open-hearth steel plant is projected, and 1 makes crucible steel.

ILLINOIS.

American Steel Foundry Company, Wells Building, St. Louis. Works at Granite City, Madison county. Three modified Siemens 10-gross-ton basic open-hearth steel furnaces erected in 1894; first steel made in November, 1894; product, railway and other large castings; annual capacity, 20,000 gross tons. Fuel, producer gas. Rolla Wells, President; Edward F. Goltra, Vice-President and Manager; L. J. Hayward, Secretary and Treasurer. Selling agents, J. W. Robinson, Wells Building, St. Louis; W. S. Calhoun, Havemeyer Building, New York City; J. V. Bell, Houston, Texas.

Calumet Works, Calumet Iron and Steel Company, Rookery Building, Chicago. Works at South Chicago, Cook county. Built in 1876 and first put in operation in August, 1876; 6 double and 10 single puddling furnaces, 7 Siemens heating furnaces, 4 trains of rolls, (one 20-inch muck, and one 9, one 14, and one 22-inch,) one 6-ton hammer, and 132 cut-nail machines (idle); product, merchant bar iron and steel, angle splices, and shafting; annual capacity, 45,000 gross tons. Fuel, petroleum. I. T. Hartz, Receiver, Rookery Building, Chicago. Idle for several years. *See Calumet Furnace in Illinois.*

Chicago Splice Bar Mill, The Sellers Manufacturing Company, Chicago. Office and works, Chicago ave. and the Chicago river. Built in 1878; one forge fire, 2 heating furnaces, and one 15-inch train of rolls; product, all kinds of splice bars, including "Samson" bars; annual capacity, 15,000 gross tons. Fuel, block coal. Adding a punching and shearing department. Morris Sellers, President; John M. Sellers, Vice-President and General Manager; P. J. Geraghty, Secretary and Treasurer; N. E. Lentz, Superintendent.

Granite City Steel Company, cor. Cass ave. and Second st., St. Louis, Mo. Works at Granite City, Madison county. Built in 1895; two 25-gross-ton Siemens basic open-hearth steel furnaces; first steel made August 30, 1895; product, steel ingots; annual capacity, 25,000 gross tons. Rolling mill contains two 4-hole soaking pits, 4 Lauth heating furnaces, and 4 trains of rolls (one 26-inch universal, one 14-inch 3-high bar, one 84 x 28-inch plate, with 2-high roughing and 3-high finishing rolls, and one 50-inch sheet); product, billets, slabs, sheet bars, and plates and sheets; annual capacity, 20,000 gross tons. Fuel, bituminous coal and producer gas. Contemplates erecting one addi-

tional 25-gross-ton Siemens acid open-hearth steel furnace. Wm. F. Niedringhaus, President; F. G. Niedringhaus, Vice-President; Alex. Niedringhaus, Secretary; Albert W. Niedringhaus, Treasurer.

Hartmann, Hay & Reis, Belleville, St. Clair county. Built in 1885-6; 2 gas heating furnaces, 1 coal heating furnace, one 22-inch train of rolls, and 61 cut-nail machines; product, cut nails; annual capacity, 150,000 kegs. Fuel, bituminous coal and manufactured gas. (Formerly called the Crescent Nail Mills.) E. E. Wangelin, Manager.

Illinois Steel Company, Rookery Building, Chicago. New York office, 46 Wall st. Four plants in Illinois—North Works, South Works, Joliet Works, and Union Works. North Works, located at Chicago, on the north branch of the Chicago river, at the foot of Wabansia ave., built in 1857; 8 heating furnaces and 2 trains of rolls; Bessemer steel works have two 6-gross-ton converters and all appliances for manufacturing rails; first blow made April 10, 1872; first steel rail rolled May 24, 1865, from steel made at Wyandotte, Michigan; product, Bessemer steel ingots, rails, and beams; annual capacity, 145,000 gross tons of ingots, 120,000 tons of rails, and 45,000 tons of beams, which last would come out of rail capacity. (All of the equipment described above is leased to the Universal Construction Company. The rolling mills and steel works are idle and are not likely to be operated in the near future by the lessee, which is now running the fitting shop only.) South Works, located at South Chicago; three 10-gross-ton Bessemer converters, twelve 10-ingot soaking pits, and one 3-high 40-inch blooming and one 3-high 27-inch finishing train, with 4 stands of rolls; first blow made June 14, 1882; product, Bessemer steel ingots, rails, and billets; annual capacity, 700,000 gross tons of ingots and 600,000 tons of rails and billets. Adding a 40-inch mill with rolls 84 inches long to roll slabs, billets, and blooms from 4 x 4 inches up to 24 x 24 inches; annual capacity, 240,000 gross tons of blooms, billets, and slabs. Open-hearth steel department added in 1894-5; first steel made February 11, 1895; one acid and nine basic furnaces (one 25-ton Siemens acid furnace, four 50-gross-ton and two 25-ton basic Wellman rolling, and three 25-ton basic Siemens furnaces); one plate train, with 2 stands of rolls, 34 x 90 and 34 x 132 inches, and 4 gas heating furnaces; product, boiler, ship, and tank plate, and billets; annual capacity, 200,000 gross tons of open-hearth ingots and 70,000 tons of plates. Joliet Works, located at Joliet, Will county, built in 1870; two 9-gross-ton Bessemer steel converters; first blow made January 26, 1873, and first steel rail rolled March 15, 1873; annual capacity, 400,000 gross tons of Bessemer steel ingots. Steel rail mill has 5 heating furnaces, one 36-inch blooming train, one 23-inch rail train, and one Sellers 3-ton hammer; annual capacity, 450,000 gross tons of rails or billets; wire-rod mill contains one Garrett mill built in 1888 and another added in 1895; 4 heating

furnaces; annual capacity, 200,000 gross tons; adding a third wire-rod mill, arranged to roll either rods or cotton-ties; merchant mill, built in 1895, contains machinery for the production of railroad supplies, including spikes, bolts, nuts, washers, etc.; annual capacity, 30,000 gross tons. Union Works, located at 3179 Ashland ave., Chicago; original mill built in 1863 and original Bessemer steel works made first blow July 26, 1871; Bessemer steel works and rail mill rebuilt in 1885-6; two 10-gross-ton converters, 5 cupolas, 4 spiegel cupolas, one 3-high 35-inch blooming mill, one gas bloom and 4 gas ingot heating furnaces, and one 3-high 25-inch rail train; product, Bessemer steel rails and billets; annual capacity, 325,000 gross tons of ingots and 270,000 tons of rails or billets. Fuel, coal and oil at the North, South, and Joliet Works; oil at the Union Works. John W. Gates, President; C. H. Foote, 1st Vice-President; W. P. Palmer, 2d Vice-President; W. A. Green, Secretary; W. H. Thompson, Treasurer; W. R. Walker, General Manager; A. M. Crane, General Sales Agent; L. D. Doty, Purchasing Agent. Officers at the various works in Illinois: North Works, F. B. Winslow, Auditor; South Works, E. A. S. Clarke, General Superintendent, and Charles F. Abbott, Auditor; Joliet Works, C. L. Miller, General Superintendent, and J. F. Wilson, Auditor. *See Rolling Mills in Wisconsin, (Milwaukee Works.) See Coke Furnaces in Illinois and Wisconsin.*

Inland Steel Company, (successor to Chicago Steel Works,) 1227-29 Marquette Building, Chicago. Works at Chicago Heights, Cook county. Built at Chicago in 1873 and removed to Chicago Heights in 1893 by the Chicago Steel Works; first put in operation at Chicago Heights in January, 1894; 2 forge fires, 8 heating furnaces, one 8 and one 14-inch train of rolls, and 6 hammers; product, bars, angles, tees, channels, agricultural shapes, harrow teeth, plow beams, cultivator attachments, light T rails, cotton-ties, and buckles; annual capacity, 30,000 gross tons of bar steel, 100,000 steel plow beams, and 1,500 tons of harrow teeth. Fuel, coal and coke in heating furnaces and bituminous coal under boilers. Brand, the word "Inland" in a diamond. J. E. Porter, President, Ottawa, Ill.; G. H. Jones, Vice-President, J. H. Porter, Secretary, and P. D. Block, Treasurer, Chicago.

Joliet Sheet Mill, Great Western Tin Plate Company, Northern Office Building, Chicago. Works at Joliet, Will county. Built in 1891-2 and put in operation May 1, 1892; 4 double heating and 2 annealing furnaces, four 24 x 32-inch hot mills, and five 20 x 32-inch cold mills; product, black plates for tinning; annual capacity, triple turn, 7,000 gross tons. Fuel, coal. J. E. Otis, Jr., President; C. H. Wilcox, Vice-President and Manager; F. S. Wheeler, Secretary and Treasurer. Sales made by the company. *See Great Western Tinplate Works in Illinois.*

Joliet Works, McKenna Steel Working Company, Milwaukee, Wisconsin. Works at Joliet, Will county. Built in 1897 and first put in

operation August 11, 1897; two 12 x 35-foot heating furnaces and 3 trains of rolls (one 12 and two 24-inch, arranged tandem); product, renewed steel rails by the McKenna process; annual capacity, 100,000 gross tons. Fuel, bituminous coal. E. W. McKenna, President; Howard Morris, Secretary and Treasurer; David H. Lentz, Manager. *See Kansas City Works, Kansas.*

Melrose Park Works, Latrobe Steel Company. Chicago office, Old Colony Building; main office, 1200 Girard Building, Philadelphia. Works at Melrose Park, Cook county. Tire mill built in 1881-2; new mill built in 1888; 2 heating furnaces and one universal tire mill, both idle. Steel department, added in 1884-5, contains one 10 and one 12-gross-ton acid open-hearth furnace; first steel made in February, 1885. Product, castings, automatic steel car couplers, and elliptic and spiral springs; annual capacity, 13,000 gross tons. Fuel, coal and petroleum. *See Latrobe Works in Western Pennsylvania.*

Norton Brothers, 813 Masonic Temple, Chicago. Works at Maywood, Cook county. One 6-gross-ton acid open-hearth steel furnace and the buildings for a rolling mill erected in 1890-1; experimenting with fluid-metal rolling machinery for the production of steel sheets for tinning. Oliver W. Norton, President; Edwin Norton, Vice-President; W. L. Gifford, Secretary; O. P. Swift, Treasurer. *See Tinplate Works in Illinois.*

Peoria Steel and Iron Works, Woolner Building, Peoria. Works at Averyville, Peoria county. Built in 1890-1 and first put in operation in 1892; 2 forge fires, 7 heating furnaces, and 4 trains of rolls (two 8, one 10, and one 18-inch); product, bars, bands, hoops, cotton-ties, special shapes, and agricultural implement material; annual capacity, 30,000 gross tons. Fuel, petroleum and coal. Also operates a bolt and nut plant. (Formerly operated by the Peoria Steel and Iron Company.) J. B. Greenhut, President; Ferd. Luthy, Vice-President; George T. Page, Secretary and Treasurer; E. J. Kahn, Assistant Secretary; George J. Gibson, Manager.

Phœnix Horse Shoe Company, Joliet, Will county. Built in 1893 and put in operation in the same year; 3 double puddling furnaces, 18 heating furnaces, and 4 trains of rolls (three 9-inch and one 3-high 20-inch); specialty, horse and mule shoes; annual capacity, 10,000 gross tons. Fuel, petroleum. Brand, "Phœnix." Charles W. Miller, President; E. H. Miller, Manager. *See Rolling Mills in New York.*

Plano Steel Works, Plano Steel Company, Plano, Kendall county. First put in operation January 1, 1885; 2 heating furnaces and one 12-inch train of rolls; product, steel shapes for agricultural implements; annual capacity, 5,400 gross tons. Fuel, coal and oil. (Formerly called Plano Rolling Mill.) Albert H. Sears, President and Manager; George Amerman, Vice-President; E. L. Henning, Secretary; W. M. Foster, Treasurer. Idle and for sale or lease.

Pullman Iron and Steel Company, Pullman, Cook county. Chicago office in Pullman Building. Built in 1883-4; 2 forge fires, 3 Swindell gas heating furnaces, 2 coal heating furnaces, and 3 trains of rolls (8-inch, 10-inch, and 18-inch); product, car and merchant iron and steel and special shapes of iron and steel; annual capacity, 27,000 gross tons of bar iron and 12,000 tons of muck bar. Fuel, coal. John S. Runnels, President; A. S. Weinsheimer, Secretary and Treasurer; J. K. Mowry, General Foreman.

Rock Island Arsenal, Rock Island, Rock Island county. One heating furnace, one 5,000-pound hammer, and one 14-inch train of rolls. Built to dispose of accumulated wrought scrap iron and to furnish material needed in the construction of the arsenal. The equipment described above is idle; other departments of the arsenal are in operation.

Sargent (The) Company, 675 Old Colony Building, Chicago. Works at Fifty-ninth and Wallace streets. Iron foundry built in 1881; crucible steel plant added in 1890; one 24-pot Siemens steel-melting furnace; first steel made February 13, 1891; product, brake shoe inserts and general castings; annual capacity, 900 gross tons. Open-hearth steel plant added in 1892; one 12-gross-ton acid Siemens furnace; first steel made September 17, 1892; product, general castings; annual capacity, 4,500 gross tons. Fuel, producer gas in crucible furnace and oil in open-hearth furnace. (Formerly called the Congdon Brake Shoe Company.) George M. Sargent, President; William D. Sargent, Vice-President and General Manager; F. W. Sargent, Secretary; H. K. Gilbert, Treasurer; J. C. Davis, Superintendent. Branch offices and selling agents: 130 Endicott Arcade, St. Paul, Minn.; 209 Security Building, St. Louis; United States National Bank Building, Omaha, Neb.; 525 Mission st., San Francisco, Cal.; 17 Place d'Armes Hill, Montreal, Canada; Parker & Topping, Portland, Oregon, and Tacoma, Washington.

Springfield Iron Company's Iron and Steel Works, The Springfield Iron Company, Springfield. Chicago office, Old Colony Building; St. Louis office, Union Trust Building. Bessemer steel works built in 1886-7; two 5-gross-ton converters; first blow made September 8, 1887; annual capacity, 135,000 gross tons of ingots. Open-hearth steel works contain two 20-gross-ton Siemens-Pernot acid furnaces and one Pernot furnace for dephosphorizing pig metal; first steel ingot made February 9, 1880; annual capacity, 18,000 gross tons. Puddle mill first put in operation in June, 1872; 8 double puddling furnaces and one 18-inch train of rolls. Blooming mill, containing one 3-high 30-inch blooming train of rolls, with hydraulic tables, put in operation in 1879, and one 2-high 32-inch reversing train, put in operation in 1887, to work in direct connection with rail mill. Rail mill put in operation in 1872 and remodeled in 1887; one 23-inch train of finishing rail rolls working in direct connection with the 32-inch bloom-

ing train; annual capacity, 135,000 gross tons of rails. Bar mills contain 13 Siemens heating furnaces and 6 trains of rolls (two 12, one 18, and one 23-inch adapted to work either iron or steel, and two 16-inch combination trains to roll steel exclusively); product, bars, fish-plates, light rails, and merchant shapes; annual capacity, 70,000 gross tons. Plate mills contain one 24-inch and one 31-inch train of rolls, the latter with rolls 112 inches in length; product, steel plates and sheets of all sizes; annual capacity, 18,000 gross tons. Fuel, Siemens producer gas in all heating furnaces. Charles Ridgely, President; William Barret Ridgely, Vice-President and Secretary; John Griffiths, Superintendent.

Sylvan Steel Company, Moline, Rock Island county. Built in 1894 and first put in operation in December, 1894; 5 gas heating furnaces, one coal heating furnace, 2 forge fires, and 4 trains of rolls (one 8, one 12, and two 16-inch); one 5-gross-ton basic open-hearth steel furnace, with an annual capacity of 3,300 gross tons of ingots, added in 1898; first steel made in March, 1898; product, merchant bar and refined iron, soft and hard steel, and iron and steel agricultural shapes; annual capacity, 25,000 gross tons. Fuel, producer gas. G. Watson French, President; J. D. Cady, Secretary; J. W. Atkinson, Treasurer; George H. Tatnal, Superintendent.

Tudor Iron Works, 415 Locust st., St. Louis, Mo. Works at East St. Louis, St. Clair county. First put in operation in January, 1873; one double and 2 single puddling furnaces, 6 scrap furnaces, 10 heating furnaces, 10 Siemens gas producers, 6 trains of rolls, and 10 automatic and 8 hand spike machines; product, railroad splices, T rails, bar iron, bolts, and spikes; annual capacity, 55,000 gross tons. Fuel, bituminous coal. Brand for spikes, "Tudor." T. A. Meysenburg, President; B. S. Adams, Secretary; F. W. Oliver, Treasurer.

Universal Construction Company, (incorporated,) Rookery Building, Chicago. Leases from the Illinois Steel Company the rolling mill and steel works at North Chicago known as the North Works. The lease does not cover the two blast furnaces and the cement works, which are operated by the Illinois Steel Company, nor other property at the North Works leased to the C. L. S. and E. R. R. Co. The lessee operates the fitting shop of the North Works only, turning out all kinds of structural work, including material for bridges and buildings. W. A. Green, President; A. J. Singer, Secretary and Treasurer. *For a detailed description of the North Works see Illinois Steel Company in Illinois.*

Valley Steel Company, Belleville, St. Clair county. Office, American Central Building, St. Louis, Mo. Built in 1882 and remodeled in 1885-6; one coal and 2 gas heating furnaces, one 23½-inch slabbing train, one 3-high 21-inch nail-plate train, and 85 cut-nail machines; product, steel nails and large flats; annual capacity, 200,000 kegs of

nails. Fuel, bituminous coal. Charles A. McNair, President; T. A. Meysenburg, Vice-President; F. W. Oliver, Secretary and Treasurer; B. S. Adams, Selling Agent.

Waukegan Works, Washburn and Moen Manufacturing Company, Waukegan, Lake county. Main office, Worcester, Mass.; Chicago office, 160-64 Lake st. Built in 1891; 6 heating furnaces for 4-inch steel wire billets, one heating furnace for 1½-inch steel billets, and one wire-rod rolling mill for steel or copper, consisting of one 15-inch, two 12-inch, and two 11-inch trains of rolls; product, wire rods and wire; annual capacity, 100,000 gross tons. Fuel, coal and coke. The works also produce all kinds of coarse steel and copper wire, galvanized wire, bale ties, barbed-wire fencing, staples, etc. *See Rolling Mills and Steel Works in Massachusetts for a list of officers and selling agents.*

Western Tube Company, (formerly Haxtun Steam Heater Company,) Kewanee, Henry county. Built in 1883 and put in operation in November, 1883; 5 double busheling furnaces, one squeezer, 5 heating furnaces, 3 trains of rolls, (one 16-inch muck and two 3-high 16-inch roughing with 2-high 16-inch finishing,) and one 5,000-pound hammer; product, skelp iron, used by the company in the manufacture of pipe; annual capacity, 40,000 gross tons. Fuel, coal and producer gas. The company manufactures everything, except boilers, used in the construction of steam heating apparatus for all kinds of buildings. J. H. Pierce, President; J. C. Williams, Vice-President; A. M. Hewlett, Secretary; C. E. McCullough, Treasurer.

Number of rolling mills and steel works in Illinois: 26. Of these 5 make Bessemer steel, 8 have open-hearth steel plants, and 1 makes crucible steel.

MICHIGAN.

Detroit Steel and Spring Works, The Detroit Steel and Spring Company, Michigan and Hubbard avenues, Detroit. First put in operation in May, 1882; 11 large and 20 small oil heating furnaces, 3 trains of rolls, (9, 12, and 18-inch,) and 8 hammers. Crucible steel department first made steel in February, 1884; one 30-pot crucible steel-melting furnace; annual capacity, 2,500 gross tons of ingots. Robert-Bessemer department built in 1889 and put in operation in July, 1889; two 2-gross-ton converters; first blow made July 11, 1889. Product, merchant steel and elliptic and spiral springs of all kinds for railroad and other purposes and steel castings; total annual capacity, 20,000 gross tons. Fuel, petroleum and coal. Brand, the letter "D" in a triangle. (Robert-Bessemer steel plant first operated under name of Michigan Steel Works.) T. H. Newberry, President and Treasurer; Dewitt Loomis, Vice-President and General Manager; Allen W. Atterbury, Secretary; J. S. Newberry, Assistant Manager.

Michigan-Peninsular Car Company, (successor to the Michigan Forge and Iron Company,) Detroit, Wayne county. Office, Union Trust Building. Forge originally built in 1870 and rolling mill in 1877; destroyed by fire in November, 1892, and immediately rebuilt; 13 heating furnaces, 5 hammers, and 3 trains of rolls (9, 16, and 20-inch); product, bar iron, car axles, links and pins, and miscellaneous forgings; annual capacity, 35,000 gross tons of bar iron, 45,000 car axles, and 5,000 tons of forgings. Fuel, coal and oil. A foundry for the manufacture of cast-iron pipe, two foundries for manufacturing car and other iron castings, two foundries for making car wheels, and large carbuilding works are also operated by the company. James McMillan, Chairman of the Board; F. J. Hecker, President; Charles L. Freer and W. C. McMillan, Managing Directors; S. S. Delano, Treasurer; Walter J. McBride, Secretary.

Muskegon Rolling Mills, Michigan Iron and Steel Company, Muskegon, Muskegon county. Rolling mill built and put in operation in 1890; 4 scrap furnaces, 1 forge fire, and three 3-high trains of rolls (one 18-inch bar and billet, one 12-inch, and one 9-inch); open-hearth steel plant added in 1891; one 20-gross-ton basic furnace; first steel made in December, 1891; plant arranged for operation in connection with the Adams direct process; product, iron and steel bars and shapes; annual capacity, 20,000 gross tons. Fuel, manufactured gas. E. P. Caldwell, President and General Manager; James C. McLaughlin, Vice-President; Leslie Durley, Secretary and Treasurer. (Formerly called the Muskegon Iron and Steel Works.).

Number of rolling mills and steel works in Michigan: 3. Of these 1 makes both Robert-Bessemer and crucible steel and 1 has an open-hearth steel plant.

WISCONSIN.

Dutcher (The J. A. and P. E.) Company, Milwaukee, Milwaukee county. Six 6-pot Noble's liquid fuel crucible steel-melting furnaces and one 3-gross-ton Wellman rotary acid open-hearth steel furnace; product, chiefly bicycle and machinery castings; annual capacity, 2,500 gross tons. Fuel, oil. P. E. Dutcher, President; A. E. Dutcher, Vice-President; H. B. Goodrich, Secretary and Treasurer; F. Lange, Superintendent.

Eagle Horse Shoe Company, South Milwaukee, Milwaukee county. Built in 1892 and first put in operation July 1, 1892; 2 forge fires, 6 heating furnaces, and 2 trains of rolls (one 9 and one 16-inch); product, horseshoes, mule shoes, and bar iron; annual capacity, 8,000 gross tons of bar iron or 120,000 kegs of horseshoes. Fuel, coal and oil. Brand, "Eagle Horse Shoes." George B. Van Norman, President; James McAlpine, Vice-President and Treasurer; L. A. McElroy, Secretary and General Manager.

Milwaukee Steel Casting Company, Milwaukee, Milwaukee county.

Built in 1897; two crucible steel-melting furnaces with 24 pots; one 6,000-lb. acid open-hearth steel furnace; product, steel castings; annual capacity, 1,100 gross tons. Fuel, oil. William O. Vilter, President; Solomon Shaw, Vice-President; Theodore F. Wambold, Secretary and Treasurer.

Milwaukee Works, Illinois Steel Company, Rookery Building, Chicago.

Works at Milwaukee, built in 1868 and 1874 and remodeled in 1895-6; 21 heating furnaces, using oil as fuel, and 8 trains of rolls (one 8, two 9, one 12, one 18, one 21, and two 22-inch); product, light rails, merchant bar steel, cotton-ties, and angle and splice bars; annual capacity, 115,000 gross tons of light rails, cotton-ties, and steel bars, and 30,000 tons of angle and splice bars. Fuel, coal and oil. Officers at Milwaukee: George L. Reis, General Superintendent, and L. W. McNamee, Auditor. *See Rolling Mills and Steel Works in Illinois. See Coke Furnaces in Illinois and Wisconsin.*

Shaw (The) Steel Casting Company, Milwaukee, Milwaukee county.

Built in 1894; four crucible steel-melting furnaces with 3 chambers each; 18 holes can be used at a time; first crucible steel made November 27, 1894; one 1-gross-ton acid open-hearth steel furnace erected in 1897; first open-hearth steel made October 15, 1897; product, steel castings; annual capacity, 750 gross tons. Fuel, oil. B. T. Leuzarder, President; J. D. Miller, Vice-President; T. H. Rice, Secretary and Treasurer; David McLain, Foundry Superintendent. (Formerly operated by Louis V. Shaw & Co.)

West Superior Iron and Steel Works, West Superior, Douglas county.

Built in 1890-1; two 4-gross-ton Bessemer steel converters, 5 heating furnaces, and 2 trains of rolls (one 30 x 90-inch train with 2 stands for plates and one 20-inch bar train); product, plates, structural shapes, and bars; annual capacity, 90,000 gross tons of ingots or 81,000 tons of rolled material. Fuel, producer gas and coal. (Formerly operated by the West Superior Iron and Steel Company.) Idle; works now owned by E. V. Cary; may be operated by the Wisconsin Steel Company. Robert Kelly, Agent.

Number of rolling mills and steel works in Wisconsin: 6. Of these 1 has a Bessemer steel plant, 3 make open-hearth steel, and 3 make crucible steel.

MINNESOTA.

Ironton (The) Structural Steel Company, main office, 29 Broadway, New York. Works at Duluth, St. Louis county, Minn. Built in 1892-3; 2 gas heating furnaces and two 30-inch trains of rolls. One 20-gross-ton acid open-hearth steel furnace, erected in 1895; first steel made in June, 1895; annual capacity, 10,000 gross tons of ingots. Product, structural steel; annual capacity, 35,000 gross tons. Fuel,

coal and manufactured gas. R. T. McCabe, President, S. B. Haupt, Vice-President, and W. R. Heath, Treasurer, New York; Henry Grey, General Superintendent, Duluth.

Minnesota Iron and Steel Company, 115 Temple Court, Minneapolis. Works at Columbia Heights, Anoka county. Built in 1894-5; 4 gas heating furnaces, 2 gas puddling furnaces, 2 gas busheling furnaces, one squeezer, and 4 trains of rolls (18-inch muck, 18-inch bar, and 9 and 12-inch guide); product, bar iron; annual capacity, 25,000 gross tons. Fuel, producer gas. Contemplates erecting two 15-gross-ton basic open-hearth steel furnaces, with an annual capacity of 20,000 gross tons of ingots. (Formerly called the Minneapolis Rolling Mills.) H. W. Lash, President; F. G. James, Secretary; M. B. Koon, Treasurer; A. D. Arundel, General Superintendent.

Rupley Iron Company, lessee, Duluth, St. Louis county. Built in 1888-9 and put in operation in October, 1889; 4 heating furnaces, 5 gas producers, 2 trains of rolls, (10 and 18-inch,) and one 6,000-lb. and two 3,000-lb. hammers; product, bar iron, rods, bolts, and forgings; annual capacity, 11,000 gross tons of rolled iron and 4,500 tons of forgings. Fuel, coal. A car-wheel plant, a car-axle plant, and a large carbuilding plant are connected with the works. George Rupley, Manager. Owned by the Duluth Manufacturing Company.

Number of rolling mills in Minnesota: 3. Of these 1 makes open-hearth steel and 1 open-hearth steel plant is projected.

MISSOURI.

Clinton Rolling Mill, Salmon & Salmon, proprietors, Clinton, Henry county. Built in 1892; one heating furnace, one steam hammer, and 2 trains of rolls (one 9 and one 12-inch); product, high-grade horse-shoe bar and refined and common bar iron; annual capacity, 4,000 gross tons. (Formerly operated by the Clinton Rolling Mill and Iron Company.) Idle and for sale.

Granite Iron Rolling Mills, St. Louis Stamping Company, Cass ave. and Second st., St. Louis. Works at Second and Destrehan sts. Built in 1879; 20 heating furnaces, 12 annealing furnaces, 2 hammers, five 32, two 36, one 44, and two 40-inch hot mills, and one 40, five 36, one 34, and two 30-inch cold mills; product, stamping sheet iron for "granite iron ware," galvanizing sheets, and black plates for tin and terne plates; annual capacity, 14,000 gross tons. Fuel, coal. Brand, "Juniata" for galvanized sheets and "Granite Mills Soft Steel" for merchant grades. F. G. Niedringhaus, President; William F. Niedringhaus, Vice-President and Manager. *See Tinplate Works in Missouri.*

Helmbacher Forge and Rolling Mills Company, corner Barton and DeKalb sts., St. Louis. Works, South Second st., between Lami and Barton sts. Built in 1858; 7 single puddling furnaces, 10 heat-

ing furnaces, 2 trains of rolls, (one 10 and one 19-inch,) and 9 hammers; product, bar, rod, and band iron, coupling links and pins, car, tender, and locomotive axles, shafts, and all kinds of railroad, steamboat, and machinery forgings; annual capacity, 12,000 gross tons of rolled and 6,000 tons of forged products. Fuel, coal. James Green, President; George R. Blackford, Vice-President; G. L. Goetz, Secretary. Selling agents, John S. Brewer, 1029 Monadnock Building, Chicago; H. C. McNair, Endicott Building, St. Paul.

Kansas City (The) Bolt and Nut Company, Kansas City. Works at Sheffield, Jackson county. Branch of the Reading Bolt and Nut Works, Reading, Pa. Built in 1887-8 and first put in operation in January, 1889; one heating furnace and one 10-inch train of rolls; product, bar and bolt iron; also bolts, nuts, spikes, etc.; annual capacity, 10,000 gross tons of bar iron and 2,700 tons of bolts, nuts, etc. Fuel, producer gas in rolling mill and petroleum in bolt works. J. H. Sternbergh, President, Reading, Pa.; P. H. Sternbergh, Vice-President and Treasurer, and R. C. Howes, Secretary, Kansas City. Selling agent, Francis T. West, Rookery Building, Chicago. *See Reading Bolt and Nut Works, Eastern Pennsylvania.*

St. Joseph Bar and Axle Company, St. Joseph, Buchanan county. Built in 1889; one large gas heating furnace, 2 busheling furnaces, 4 trains of rolls, (one 3-high 10-inch, two 3-high 18-inch, and one 3-high 20-inch,) one rotary squeezer, 50 cut-nail machines, (idle,) and one steam hammer; product, merchant iron and steel and steel nails; annual capacity, 200,000 kegs of nails and 9,000 gross tons of rolled iron and steel. Fuel, producer gas and coal. (Two 3-gross-ton Robert-Bessemer steel converters partly erected in 1889; not completed; abandoned.) George T. Walker, Vice-President and General Manager. (Formerly operated by the Union Steel and Iron Company.)

St. Louis Steam Forge and Iron Works, corner Main and Miller sts., St. Louis. Built in 1862; one double puddling furnace, 4 forge fires, 10 heating furnaces, one train of 18-inch rolls, and 6 hammers; product, bar iron, car axles, and railroad and steamboat forgings of iron or steel; annual capacity, 9,000 gross tons of axles and forgings and 2,250 tons of bar iron. Fuel, coal. G. C. McDonald, President; C. L. McDonald, Secretary and Treasurer.

Shickle, Harrison, and Howard Iron Company, Twelfth st., near Choctau ave., St. Louis. Original works built in 1860; steel plant added in 1892; three 8-gross-ton basic open-hearth steel furnaces; first steel made in September, 1892; product, car couplers, car bolsters, car trucks, and general railway and machine castings; annual capacity, 9,000 gross tons. Fuel, producer gas. John W. Harrison, President; John M. Harrison, Vice-President and Treasurer; Thomas M. Gallagher, 2d Vice-President and General Superintendent; James Daniels, Secretary.

Number of rolling mills and steel works in Missouri: 7. Of these 1 makes open-hearth steel.

IOWA.

Williams Rolling Mill, Mrs. Jane Clark, owner, Pittsburgh. Works at Muscatine, Muscatine county. Built in 1893 and first put in operation in October, 1893; 3 Siemens gas heating furnaces and 3 trains of rolls (two 9 and one 14-inch); product, bars, bands, and flats; annual capacity, 15,000 gross tons. Fuel, coal. (Formerly owned by I. W. Bollinger, of Chicago; last operated by the Williams Rolling Mill Company.) For sale.

Number of rolling mills in Iowa: 1.

KANSAS.

Kansas City Steel and Iron Works, Nathan Schee, 3712 Fourth st., Des Moines, Iowa. Works at Argentine, Wyandotte county. Built in 1895; one 18-pot crucible steel-melting furnace; first steel made in June, 1895; product, fine crucible steel castings; annual capacity, 1,250 gross tons. Fuel, producer gas. Idle; works may resume operations in 1898.

Kansas City Works, McKenna Steel Working Company, Milwaukee, Wisconsin. Building works at Kansas City, Wyandotte county, to contain two 12 x 35-foot heating furnaces and 3 trains of rolls (one 12 and two 24-inch, arranged tandem); product, renewed steel rails by the McKenna process. Annual capacity, 100,000 gross tons. Fuel, bituminous coal. Expect to have plant ready for operation about July 1, 1898. John A. Lentz, Manager. *See Joliet Works in Illinois for a list of officers.*

Number of rolling mills and steel works in Kansas: 1 completed and 1 building. Of these 1 makes crucible steel.

COLORADO.

Colorado (The) Fuel and Iron Company, Pueblo. Principal office, Boston Building, Denver; Chicago office, Rookery Building; Salt Lake office, 202 Auerbach Building. Works at Bessemer, near Pueblo, Pueblo county. Built in 1881-2 and extensive improvements made in 1889, 1891, and 1893; Bessemer converting department made its first blow April 11, 1882; two 5-gross-ton converters, 3 pig iron and 2 spiegel melting cupolas, 3 gas-fired soaking pits, 2 Siemens bloom-heating furnaces, 5 scrap heating furnaces, one 2-high 36-inch reversing blooming train, one 3-high 28-inch roughing train, one 3-high 26-inch finishing train, one 30 x 78-inch plate train, one 12 and one 20-inch bar train, one 9-inch guide train, and railroad spike and bolt and nut machines; product, standard steel rails, bar iron and steel, mine rails, angle bars, tank plate, structural shapes, railroad spikes,

and nuts and bolts; annual capacity, 200,000 gross tons of steel rails, 30,000 tons of tank plate, 50,000 tons of structural shapes, 50,000 tons of bar iron and steel, mine rails, and angle bars, and 80,000 kegs of railroad spikes, bolts, and nuts. Also operates a cast-iron pipe foundry with an annual capacity of 18,000 gross tons. Fuel, coal and producer gas. Rail mill remodeled and plate and structural mill added in 1897. Officers at Denver: J. C. Osgood, President; Henry R. Wolcott, 1st Vice-President; J. A. Kebler, 2d Vice-President and General Manager; A. C. Cass, 3d Vice-President and General Sales Agent; John L. Jerome, Treasurer; D. C. Beaman, Secretary and General Attorney; J. A. Writer, Auditor; S. G. Pierson, Purchasing Agent; W. A. Wetmore, Assistant General Sales Agent; S. I. Heyn, Assistant Secretary. At Bessemer: T. W. Robinson, General Superintendent. *See Furnaces in Colorado.*

Denver (The) Rolling Mills and Iron Company, Denver, Arapahoe county. Built in 1894; one coal-fired heating furnace and one 10-inch train of rolls; product, merchant bar iron and bolts; annual capacity, 1,000 gross tons. Fuel, coal. (Formerly operated by the Queen City Scrap Iron Company.) A. Goodstein, President and Treasurer; I. Goodstein, Vice-President and Manager; A. Greinetz, Secretary; J. J. Fisher, Superintendent.

Number of rolling mills and steel works in Colorado: 2. Of these 1 makes Bessemer steel.

WYOMING.

Laramie Rolling Mills, The Laramie Iron and Steel Company, lessee, Laramie, Albany county. Built in 1874-5 and put in operation in April, 1875; 5 heating furnaces, 1 puddling furnace, 1 squeezer, 2 trains of rolls, (one 10 and one 19-inch,) and one 4,500-lb. hammer; product, bar and rod iron, mine rails, nuts, car, bridge, and machine bolts, spikes and track fastenings, and coupling pins and railway forgings; annual capacity, 24,600 gross tons of rolled and 1,000 tons of forged products. Fuel, coal. Contemplate adding one 10-gross-ton open-hearth steel furnace. (Formerly operated by The Laramie Rolling Mill Company.) Otto Gramm, President, Treasurer, and Manager. Selling agent, C. L. Baum, Salt Lake City, Utah. Owned by the Union Pacific Railway Company.

Number of rolling mills in Wyoming: 1. An open-hearth steel plant is projected.

WASHINGTON.

Western Iron and Steel Company, Lakeview, Pierce county. Built in 1894, using machinery from the dismantled mill of the Holcomb-Brown Iron Company, of Burlington, Iowa; first put in operation May 1, 1895; 3 coal heating furnaces, 2 trains of rolls, (9 and 16

inch,) and one 30-ton hammer; product, merchant bar iron; annual capacity, 24,000 gross tons. Fuel, bituminous coal. Contemplates erecting one 5-gross-ton basic open-hearth steel furnace. E. M. Wilson, President and General Manager; F. Campbell, Vice-President; Alexander Bain, Secretary and Treasurer; William S. Tideman, Superintendent.

Number of rolling mills in Washington: 1. An open-hearth steel plant is projected.

OREGON.

Portland Rolling Mills, Portland, Multnomah county. Built in 1892 and first put in operation in September, 1892; 2 heating furnaces and 2 trains of rolls (one 10 and one 16-inch); product, bar, band, and hoop iron; annual capacity, 8,000 gross tons. Fuel, bituminous coal. (Formerly operated by N. E. Ayer & Co.) W. B. Ayer, President; H. C. Jefferds, Secretary; N. E. Ayer, Treasurer and Manager.

Number of rolling mills in Oregon: 1.

CALIFORNIA.

Central Pacific Railroad Rolling Mill, Southern Pacific Company, Sacramento, Sacramento county. Built in 1881; 9 heating furnaces, 3 trains of rolls, (two 12 and one 18-inch,) and 7 hammers; product, all kinds of bar and shaped iron; annual capacity, 14,000 gross tons of rolled and 3,320 tons of forged products. Fuel, Australian coal. Brand, "C. P. R. R." H. J. Small, General Manager of mill.

Judson Manufacturing Company, Oakland, Alameda county. Office and salesroom, cor. Howard and Beale sts., San Francisco. Built in 1882; 4 coal heating furnaces, one 4-door 7 x 18 gas heating furnace, 4 trains of rolls, (one 8, one 10, and two 16-inch,) 15 cut-nail machines, and 16 wire-nail machines; product, bar iron, tack plate, tacks, fine lath and cut nails, and structural and agricultural shapes; annual capacity, single turn, 11,000 gross tons of finished iron, 25,000 kegs of cut nails, and 35,000 kegs of wire nails. Fuel, oil. Brand, "Judson." H. E. Bothin, President and General Manager; W. R. Whittier, Vice-President; J. D. Osborne, Secretary. Sales made from the San Francisco office.

Los Angeles Iron and Steel Works, R. H. Herron, Los Angeles, Los Angeles county. Built in 1893-4 and put in operation August 27, 1894; 2 direct heating furnaces (one pair and one sheet furnace) and 4 trains of rolls (one 3-high 20 x 84-inch muck, one 3-high 22 x 60-inch plate, one 26 x 60-inch sheet roughing, and one 22 x 42-inch sheet finishing); product, iron and steel sheets and light plates; annual capacity, 7,000 gross tons. Fuel, petroleum. A galvanizing plant is connected with the works. (Formerly operated by the Los Angeles Iron and Steel Company.)

Pacific Iron and Nail Company, 132 Market st., San Francisco. Cable address, "Nails." Works at Oakland, Alameda county. Commenced operations May 1, 1883; 2 puddling furnaces, 4 heating furnaces, rotary squeezer, one 3-high 14-inch train of rolls, 1 muck-bar train, 1 nail-plate train, 1 hammer, 50 cut-nail machines, 22 wire-nail machines, and 20 barbed-wire machines; product, wire nails, barbed fence wire and market wire, iron cut nails, and steel cut nails from imported slabs; annual capacity, 200,000 kegs. Also makes nails of combined iron and steel. Fuel, chiefly Australian coal. The company has a complete wire-drawing plant, with 22 blocks, and draws wire from imported rods. Herrmann J. Sadler, President and Treasurer; C. W. Wright, Vice-President and General Manager; William F. Mau, Secretary.

Pacific Rolling Mill and Forge, The Pacific Rolling Mill Company, Mission and First sts., San Francisco. P. O. Box 2,032. Works at Potrero, San Francisco. Put in operation July 25, 1868; 4 single puddling and 17 heating furnaces, 8 trains of rolls, (one 8, one 10, one 12, three 18, one 28-inch blooming, and one 28-inch structural,) 4 spike and 2 rivet machines, 5 bolt headers, 1 pointer, 5 hot-press nut machines, 16 punching and straightening presses, 11 steam hammers, and 2 belt hammers; product, bar iron, angle iron, beams, channels, etc., shafting, 12 to 60-lb. iron and steel rails, railroad, ship, and boat spikes, bridge work, bolts, (all kinds except carriage,) nuts, washers, boiler rivets, horseshoe shapes, car axles, and all kinds of railroad and ship forgings. Steel department added in 1884; one 5-gross-ton acid, one 18-ton acid, and one 18-ton basic open-hearth steel furnace; first steel made July 15, 1884; product, structural shapes, forgings, castings, etc. Total annual capacity, 40,000 gross tons. Fuel, coal. The company also controls a horseshoe works, which is operated in connection with its plant. Charles S. Neal, President; L. F. Monteagle, Vice-President; Leon D. Smith, Secretary; Patrick Noble, General Manager.

Number of rolling mills and steel works in California: 5. Of these 1 makes open-hearth steel.

UNITED STATES.

Total number of rolling mills and steel works in the United States in April, 1898: 504 completed, 4 building, 3 partly completed but work suspended, and 4 projected. Of these 42 have Bessemer steel plants and 1 Bessemer steel plant is projected, 2 have Clapp-Griffiths steel plants, 1 has a Robert-Bessemer steel plant, 99 have open-hearth steel plants and 10 open-hearth steel plants are projected, 45 have crucible steel plants and 1 crucible steel plant is projected, 9 have plants for making blister steel, 3 have plants for making special steel, and 1 has a plant for making Hadfield steel.

ROLLING MILLS LONG INACTIVE OR WHICH HAVE RECENTLY BEEN ABANDONED.

A few of the rolling mills named in this list are supplied with good machinery, and circumstances may at some time favor their revival. Where the names of companies or firms are mentioned with the works they are in almost every instance the names of the owners or lessees of the plants when first placed in this list. A list of rolling mills which have long been abandoned will be found in the editions of the Directory for 1892, 1894, and 1896.

MASSACHUSETTS.

Washburn and Moen Manufacturing Company, Worcester, Worcester county. Grove Mill, or North Works, built in 1868; now produces wire only; rod train removed to the Quinsigamond Works.

Washburn Car-Wheel Company, Hartford, Conn. Works at Worcester, erected in 1864; product, crucible steel car-wheel tires used by the company; abandoned and dismantled.

NEW YORK.

Manhattan Rolling Mill, John Leonard, 452 West street, New York City. Built in 1881; product, horseshoe iron and small flats and rods; abandoned and dismantled. *See page 80.*

NEW JERSEY.

Elizabeth Tin Plate Company, Dix Building, Elizabeth, Union county. Commenced building a rolling mill in 1896; product, to be black plates for tinning; work suspended; abandoned.

PENNSYLVANIA.

Eagle Iron Works, Curtins & Co., Roland, Centre county. Telegraph address, Bellefonte. Built in 1830; product, wire billets, boiler-plate pile covers, and assorted bar iron from half-inch round and square to 4-inch tire; abandoned and dismantled.

Eagle Rolling Mill and Tube Works, J. W. Friend & Co., Pittsburgh. Works, thirty-fourth ward, South Side. Rolling mill built and put in operation in 1848; product, muck bar; idle for several years.

Emporium Steel Company, Emporium, Cameron county. Works for the manufacture of steel by a special process built in 1893; first steel made in December, 1893; product, tool steel and oil-well tools; abandoned.

- Kensington Iron Works, H. Lloyd's Sons Company, (incorporated,) Pittsburgh, Allegheny county. Works on Second ave. Built in 1828; product, bars, flat rails, and 12 to 30-lb. T rails; abandoned and dismantled in 1898.
- Keystone Horse Shoe Works, Merchants Trust Company, assignee for benefit of creditors, 611 Chestnut st., Philadelphia. Works at Seventeenth and Clearfield sts. First put in operation January 1, 1873; rebuilt in 1884; product, merchant bar, band, hoop, and skelp iron; abandoned.
- Laurel Iron Works, Laurel, Chester county. Built in 1825; product, flue and tube iron; abandoned and dismantled.
- Lock Haven Nail Works, Lock Haven, Clinton county. Built in 1886-7; product, iron and steel cut nails; abandoned and dismantled.
- Millvale Rolling Mill, Bennett, Millvale borough, Allegheny county. Built in 1850, burned December 11, 1881, and rebuilt in 1882; product, iron and steel plates; dismantled in 1898.
- Northumberland Iron and Nail Works, Van Alen & Co., Northumberland, Northumberland county. Built in 1867; product, axe bar, nail plate, and muck and scrap bar; a nail factory, formerly connected with this plant, was destroyed by fire on December 29, 1894; dismantled in 1896.
- Oliver Iron and Steel Company, Pittsburgh, Allegheny county. Lower mills at Wood's Run Station, Allegheny City, built in 1867; product, skelp iron; abandoned and dismantled.
- Phillips, (F. R.,) of Philadelphia, and a syndicate of capitalists contemplated erecting a rolling mill and an open-hearth steel plant at Reading, Berks county, in 1896; enterprise abandoned.
- Stony Creek Rolling Mill, Norristown, Montgomery county. Built in 1849 and rebuilt in 1879 and 1887; product, grooved and sheared skelp iron, merchant bars, ovals, half ovals, rounds, and horseshoe iron; abandoned and dismantled in 1896.

MARYLAND.

- McCullough Iron Company, North East and Rowlandsville, Cecil county. Office, Equitable Building, Wilmington, Del. Two works in Cecil county: North East Works, at North East, and Octoraro Works, at Rowlandsville. The North East Works were originally built in 1847 and were partly destroyed by fire in 1894; product, sheet iron for galvanizing and refined and best bloom bar iron. A forge connected with the works was built in 1847 and 1875; product, charcoal blooms made from pig iron, all consumed in the company's rolling mills. The Octoraro Works were originally built in 1829; product, sheet iron for galvanizing and "Harvey's patent cleaned" sheet iron. The Girard Life Insurance, Annuity, and Trust Company, of Philadelphia, and Henry Whiteley, Receivers. Both works idle and for sale.

VIRGINIA.

Goshen Rolling Mill, C. R. Baird & Co., Bullitt Building, Philadelphia. Works at Goshen Bridge, Rockbridge county. Rolling mill partly erected in 1890-1; never completed; abandoned and dismantled.

Midway Iron Works, Midway Iron Company, Roanoke, Roanoke county. Built about 1890; product, railroad spikes from rods; abandoned and dismantled; machinery used in equipping the Sheffield Rolling Mill, at Sheffield, Alabama.

Richlands Iron Company, Richlands, Tazewell county. Philadelphia office, 333 Walnut st. Built in 1891; product, muck bar; dismantled.

Roanoke Rolling Mill, Crozer Iron Company, Roanoke, Roanoke county. General office, Upland, Pa. Built in 1888-9 and put in operation May 1, 1889; product, muck bar and merchant iron; abandoned and dismantled; machinery used in equipping the Sheffield Rolling Mill, at Sheffield, Alabama.

Shenandoah Rolling Mill, W. J. Carlin, 6323 Marchand st., East End, Pittsburgh, Pa. Shenandoah Furnace Company began building a rolling mill at Shenandoah, Page county, in 1891; work suspended in 1892; never completed; dismantled and machinery sold.

Vulcan Iron Works, Vulcan Iron Company, B. Rand Wellford, Receiver, Richmond, Henrico county. Bolt and nut works established in 1866; rolling mill added in 1887; product, bars, bolts, nuts, washers, and iron forgings and castings; abandoned and dismantled.

TENNESSEE.

Buffalo Iron Company's Works, Thomas Carlin's Sons, Allegheny, Pa. Works (formerly owned by The Buffalo Iron Company) at Chattanooga, Hamilton county. Rolling mill built in 1864; open-hearth steel plant added in 1877-8; first cast made June 6, 1878; Bessemer converter built in 1886-7; first blow made May 7, 1887; abandoned and dismantled.

TEXAS.

Denison (The) Rolling Mill Company, Denison, Grayson county. Built in 1891 and put in operation in January, 1892; product, merchant iron and cotton-ties; abandoned and dismantled.

OHIO.

Akron (The) Iron and Steel Works, Akron, Summit county. Built in 1866; product, best common, refined, and charcoal bar iron, shafting, and light T rails, 12 and 16-lbs. per yard; specialties, patent calendered iron and steel shafting and iron for agricultural implements; abandoned in 1898; machinery for sale; address Reade & Bowler, Cleveland, Ohio.

Brilliant Tube and Pipe Works, Brilliant, Jefferson county. Rolling

mill started in September, 1883; product, muck bar, skelp, and finished bars; abandoned in 1898; machinery for sale; address Lewis & Hazlett, Wheeling, West Virginia.

Findlay Rolling Mill, Findlay, Hancock county. Built in 1887 and first put in operation August 6, 1887; enlarged in 1890; product, muck bar and bar iron; abandoned; machinery for sale; address Reade & Bowler, Cleveland, Ohio.

Hubbard Works, The Mahoning Valley Iron Company, Youngstown. Works at Hubbard, Trumbull county. Built in 1872 and first put in operation in 1873; product, muck bar; dismantled in 1898.

Wellston Steel and Nail Mill, First National Bank, Ironton. Works at Wellston, Jackson county. Built in 1886; product, steel cut nails; annual capacity, 160,000 kegs; abandoned and for sale.

ILLINOIS.

Centralia Iron and Steel Works, Centralia, Marion county. Built in 1878; product, bar iron; Bessemer steel converter added in 1887-8; dismantled. (Formerly called the Centralia Iron and Nail Works.)

Fowler Foundry Company, Stony Island ave. and Ninety-fifth st., Chicago. Built in 1887; double gas heating furnace, with machinery for rolling solid steel car-wheel blanks into finished integral steel car-wheels; Robert-Bessemer converter added in 1889; abandoned.

Fowler Rolling Mill, Fowler Rolling Mill Company, Fifty-ninth st. and C. & W. I. R. R., Chicago. Built in 1882; product, "Fowler" railroad spikes; abandoned and will probably be dismantled.

MICHIGAN.

Eureka Iron and Steel Works, Wyandotte, Wayne county. Built in 1855; partly destroyed by fire in 1895; product, "Wyandotte" boiler plate and tank iron and bars; abandoned.

MISSOURI.

St. Louis Ore and Steel Works, South St. Louis. Built in 1872 as an iron-rail mill; Bessemer steel converters added in 1875-6; product, steel slabs, blooms, billets, and rails; dismantled.

KANSAS.

Western Iron Company, Rosedale, Wyandotte county. Built in 1875; product, mine and street rails, fish-plates, bolts, nuts, spikes, merchant bar iron, etc.; abandoned and dismantled.

WASHINGTON.

Pennsylvania Iron and Steel Company, Edmonds, Snohomish county. Commenced building a rolling mill in 1894 for the production of plates, sheets, bars, and round and square iron and steel; buildings completed; machinery never put in place; abandoned.

STEEL WORKS LONG INACTIVE OR WHICH HAVE RECENTLY BEEN ABANDONED.

A list of steel works which have long been abandoned will be found in the editions of the Directory for 1892, 1894, and 1896.

American (The) Cast Steel Company, Hammond, Lake county, Ind.

One furnace erected in 1895 for the manufacture of steel by a special process; product, steel castings; abandoned.

Bessemer Land and Improvement Company, Bessemer, Jefferson county, Alabama, contemplated erecting an open-hearth steel plant at Bessemer in 1896; abandoned for the present.

Buffalo Iron Company's Works, Thomas Carlin's Sons, Allegheny, Pa.

Works (formerly owned by the Buffalo Iron Company) at Chattanooga, Hamilton county, Tenn. Open-hearth steel plant added to a rolling mill in 1877-8; first cast made June 6, 1878; two 10-gross-ton Siemens furnaces. One 5-ton Bessemer converter built in 1886-7; first blow made May 7, 1887; utilized in 1891 for experiments in producing Basic-Bessemer steel; first Basic-Bessemer steel made August 24, 1891. Abandoned and dismantled.

Centralia Iron and Steel Works, Centralia, Ill. One 2-gross-ton Bessemer steel converter built in 1887-8; dismantled.

Chester Steel Castings Company, 407 Library st., Philadelphia. Works at Chester, Delaware county, Pa. Two 1-gross-ton Robert-Bessemer steel converters erected in 1889; first steel made in November, 1889; abandoned.

Damascus Steel Company, Des Moines, Polk county, Iowa. Began in 1893 to experiment in the manufacture by the "Dawson" process of soft crucible steel castings from refined wrought iron; abandoned.

Emporium Steel Company, Emporium, Cameron county, Pa. Works for the manufacture of steel by a special process built in 1893; first steel made in December, 1893; product, tool steel and oil-well tools; abandoned.

Fowler Foundry Company, Stony Island ave. and Ninety-fifth st., Chicago, Ill. Rolling mill built in 1887; Robert-Bessemer plant added in 1889; one 2-gross-ton converter; first blow made September 5, 1889; product, steel castings of every description; abandoned.

Harvey Steel Company, Brill's Station, Essex county, New Jersey. Two 4-pot crucible steel-melting holes for experimental purposes; abandoned.

Millvale Rolling Mill, Bennett, Millvale borough, Allegheny county, Pa.

- Open-hearth steel plant built in 1886; two 15-gross-ton acid furnaces; product, steel plates; dismantled in 1898.
- New Castle Steel Casting Company, New Castle, Lawrence county, Pa. Crucible steel plant, with a capacity of 22 pots at each heat, built in 1891; product, steel castings. Idle.
- Oliver Iron and Steel Company, Pittsburgh, Allegheny county, Pa. Clapp-Griffiths steel plant built in 1884; two 2-gross-ton stationary converters for the production of steel for miscellaneous uses; first blow made March 25, 1884; dismantled in 1896.
- Oxford Iron and Steel Works, William & Harvey Rowland Incorporated, Frankford, Philadelphia, Pa. Sixteen 2-pot crucible steel melting furnaces; abandoned.
- Pennsylvania Steel Refining Company, Frederick Brown Building, Fifth and Chestnut sts., Philadelphia, Pa. Works, 50 North Twenty-third st. Product, high-grade tool steel made from open-hearth and low-grade Bessemer steel; machinery removed to Greensburg, Westmoreland county, Pa., in 1896, and a portion of it used in the plant of the Pittsburgh Tool Steel Company.
- Pittsburgh (The) Separating and Casting Company, P. O. Box 276, Pittsburgh. Works at West Bridgewater, Beaver county, Pa. One Swindell open-hearth furnace for producing steel castings; abandoned.
- Pittsburgh Works, The American Steel Casting Company, Pittsburgh. One 18 and two 24-pot crucible steel-melting furnaces; abandoned.
- Potter and Hollis Foundry Company, Rookery Building, Chicago. One 1,000-lb. standard Bessemer converter erected at East Chicago, Lake county, Indiana, in 1895, to manufacture steel by the Walrand-Legenisel process; first steel made October 14, 1895; Indiana works abandoned in 1896 and converter removed to and erected at Chicago; product, steel castings; Chicago works dismantled in 1897.
- Ramel-Conley Iron and Steel Company, Brewster, New York. Built in 1888-9; 12 retorts and one 10-gross-ton open-hearth steel furnace; retorts intended for reducing ore by the Conley direct process, producing a raw material for use in the open-hearth furnace. Idle.
- St. Joseph Bar and Axle Company, St. Joseph, Buchanan county, Missouri. Two 3-gross-ton Robert-Bessemer steel converters partly erected in 1889 by the Union Steel and Iron Company; not completed; work suspended; converters abandoned.
- St. Louis Ore and Steel Works, South St. Louis, Mo. Two 7-gross-ton Bessemer steel converters built in 1875-6; dismantled.
- Sanderson Brothers Steel Company, Syracuse, Onondaga county, New York. Two steel cementing furnaces; abandoned.
- Washburn Car-Wheel Company, Hartford, Conn. Works at Worcester, Mass. Built in 1864; sixteen 4-pot crucible steel furnaces; dismantled.
- Youngstown (The) Steel Company, Youngstown, Ohio. One 20-gross-ton Siemens acid open-hearth steel furnace; abandoned.

BESSEMER STEEL WORKS.

In this list are included all works which produce steel by the method of blowing air into or through molten iron, including the ordinary Acid-Bessemer process, the Basic-Bessemer process, the Clapp-Griffiths process, and the Robert-Bessemer process. The ton used in giving the capacity of the converters is the ton of 2,240 pounds. When not otherwise stated the converters are the ordinary tilting Bessemer converters. For a full description of these works see the list of rolling mills and steel works beginning on page 73. When works are equipped with machinery for rolling standard sections of steel rails this fact is stated. A list of plants equipped for the production of Bessemer steel castings is given on page 216.

MASSACHUSETTS—1.

Tremont Nail Works, Tremont Nail Company, West Wareham, Plymouth county. One 3-gross-ton Clapp-Griffiths converter.

NEW YORK—1.

Troy (The) Steel Company, Troy, Rensselaer county. General office, Troy; New York office, 40 Wall st. Works on Breaker Island, (opposite Troy.) Three 15-gross-ton basic converters.

PENNSYLVANIA—20 COMPLETED AND 1 PROJECTED.

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Works in the twenty-fourth and twenty-fifth wards, South Side. Two 10-gross-ton acid converters. Light steel rails.

Bethlehem (The) Iron Company, South Bethlehem, Northampton county. Main office, South Bethlehem; Philadelphia office, 421 Chestnut st. Four 7½-gross-ton acid converters. Standard sections of steel rails.

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro, Berks county. Two small acid converters. Idle.

Cambria Iron Company, Harrison Building, southwest cor. Fifteenth and Market sts., Philadelphia. Works at Johnstown, Cambria county. Four 11½-gross-ton acid converters. Street and standard sections of steel rails.

Carnegie (The) Steel Company, Limited, general offices, Carnegie Building, Pittsburgh. Three Bessemer steel works in Allegheny county. Edgar Thomson Steel Works, at Bessemer, two miles from Pittsburgh; four 15-gross-ton acid converters; light and standard sections of steel rails. Duquesne Steel Works, at Duquesne, four miles from

- Pittsburgh; two 10-gross-ton acid converters; standard sections of steel rails. Homestead Steel Works, at Munhall, one mile from Pittsburgh; two 10-gross-ton acid converters; steel girder rails.
- Columbia (The) Iron and Steel Works, Uniontown, Fayette county. Two 5-gross-ton acid converters. Purchased at sheriff's sale by The Safe Deposit and Trust Company of Pittsburgh as trustee for the first mortgage bondholders. Idle and for sale.
- Lackawanna Iron and Steel Company, Scranton, Lackawanna county. New York office, 52 Wall st. Two works at Scranton. North Works; three 7-gross-ton acid converters; standard sections of steel rails. South Works; two 9-gross-ton acid converters; standard sections of steel rails.
- Lickdale Iron Works, Lickdale, Lebanon county. Two 3-gross-ton acid converters. Samuel Weiss, Lebanon, executor of John H. Lick, owner. Idle for several years and for sale or lease.
- National Tube Works Company, McKeesport, Allegheny county. Two 8-gross-ton acid converters.
- North Branch Steel Works, The North Branch Steel Company, Danville, Montour county. Philadelphia office, Twenty-fifth st. and Washington ave. Two 4-gross-ton acid converters, never put in operation. Light and heavy T and street steel rails.
- Oliver and Snyder Steel Company, German National Bank Building, Pittsburgh. Works at Twenty-seventh and Smallman sts. Two 5-gross-ton acid converters.
- Pennsylvania Steel Works, The Pennsylvania Steel Company, Steelton, Dauphin county. Office, 312-19 Girard Building, Broad and Chestnut sts., Philadelphia. Three 10-gross-ton acid converters. Steel street rails and rails of all sections.
- Pottstown Iron Works, Pottstown Iron Company, Pottstown, Montgomery county. Philadelphia office, 400 Chestnut st. Three 10-gross-ton basic converters.
- Shenango Valley Steel Works, Shenango Valley Steel Company, New Castle, Lawrence county. Two 8-gross-ton acid converters.
- Shoenberger Steel Company, (Juniata Iron and Steel Works,) Pittsburgh. Works, Fifteenth and Etna sts. Two 6-gross-ton acid converters.
- Spang (The) Steel and Iron Company, Pittsburgh. Office and works, Etna, Allegheny county. Two 3-gross-ton Clapp-Griffiths converters. Idle and for sale.
- Wellman Steel Works, Thuplow, Delaware county. Two 3-gross-ton acid converters. Idle and for sale. Address Samuel A. Crozer, Up-land, Delaware county, Pa.
- Woodsons (The) Steel Company, Pittsburgh. Contemplates erecting two 8-gross-ton acid converters in Allegheny county about 12 miles above McKeesport and about 24 miles from Pittsburgh.

MARYLAND—1.

Maryland Steel Company, Girard Building, Broad and Chestnut sts., Philadelphia. Works at Sparrow's Point, Baltimore county. Two 20-gross-ton acid converters. Standard sections of steel rails.

VIRGINIA—1.

Old Dominion Nail Works, Old Dominion Iron and Nail Works Company, Richmond, Henrico county. Works on Belle Isle, in the city of Richmond. Two 3-gross-ton acid converters; converters idle since 1888.

WEST VIRGINIA—2.

Riverside Iron Works, Wheeling. Works at Benwood, Marshall county. Two 5-gross-ton acid converters. Light T rails.

Wheeling Steel Works, Wheeling Steel and Iron Company, Wheeling. Works at Benwood, Marshall county. Two 6-gross-ton acid converters.

KENTUCKY—1.

Ashland Steel Company Incorporated, Ashland, Boyd county. Two 5½-gross-ton acid converters.

OHIO—7.

Etna-Standard Iron and Steel Company, Bridgeport, Belmont county. Junction Works, at Mingo Junction, Jefferson county; two 5-gross-ton acid converters. The steel department is being modernized, and is to contain two 10-gross-ton acid converters; will be in operation in July or August, 1898. The two 5-gross-ton converters will then be abandoned. Light steel T rails.

Bellaire Steel Company, Bellaire, Belmont county. Two 10-gross-ton acid converters.

Cleveland Rolling Mill Company, Western Reserve Building, Cleveland. Works chiefly located at Newburgh, Cuyahoga county. Two 10-gross-ton acid converters. Standard steel and girder rails.

Johnson (The) Company, Lorain, Lorain county. Two 12-gross-ton acid converters. Steel girder and T rails and street railroad specialties.

King, (The) Gilbert, and Warner Company, Columbus, Franklin county. Two 4½-gross-ton acid converters.

Ohio (The) Steel Company, Youngstown, Mahoning county. Two 10-gross-ton acid converters. Standard sections of steel rails.

Otis (The) Steel Company Limited, Cleveland, Cuyahoga county. Two 5-gross-ton acid converters.

INDIANA—3.

East Chicago Steel Works, Chicago Steel Manufacturing Company, Hammond, Lake county. Two 3-gross-ton acid converters. Idle for several years.

Premier Steel Company, Indianapolis, Marion county. Two 4-gross-ton basic converters. (In litigation; works idle; to be sold; date of sale uncertain.)

Union Steel Company, 415 Locust st., St. Louis, Mo. Works at Alexandria, Madison county. Two 5-gross-ton acid converters. Small steel rails.

ILLINOIS—5.

Illinois Steel Company, Rookery Building, Chicago. New York office, 46 Wall st. Four works in Illinois—North Works, South Works, Joliet Works, and Union Works. North Works, at Chicago; two 6-gross-ton acid converters; standard sections of steel rails; leased to the Universal Construction Company, (incorporated,) Rookery Building, Chicago; rolling mills and steel works idle and not likely to be operated in the near future by the lessee. South Works, at South Chicago; three 10-gross-ton acid converters; light and standard sections of steel rails. Joliet Works, at Joliet, Will county; two 9-gross-ton acid converters; standard sections of steel rails. Union Works, at 3179 Ashland ave., Chicago; two 10-gross-ton acid converters; standard sections of steel rails.

Springfield Iron Company's Iron and Steel Works, The Springfield Iron Company, Springfield. Chicago office, Old Colony Building. Two 5-gross-ton acid converters. Standard sections of steel rails; also light rails.

MICHIGAN—1.

Detroit Steel and Spring Works, The Detroit Steel and Spring Company, Michigan and Hubbard avenues, Detroit. Two 2-gross-ton Robert-Bessemer converters. Converters used for steel castings only.

WISCONSIN—1.

West Superior Iron and Steel Works, Wisconsin Steel Company, West Superior, Douglas county. Two 4-gross-ton acid converters. (Formerly operated by the West Superior Iron and Steel Company.)

COLORADO—1.

Colorado (The) Fuel and Iron Company, Pueblo. Principal office, Boston Building, Denver. Works at Bessemer, near Pueblo, Pueblo county. Two 5-gross-ton acid converters. Standard sections of steel rails; also mine rails.

UNITED STATES.

Total number of Bessemer steel works in the United States in April, 1898: 45 completed and 1 projected. Of these 2 are Clapp-Griffiths plants with 3 converters and 1 is a Robert-Bessemer plant with 2 converters. Total number of converters: 100 completed and 2 projected.

OPEN-HEARTH STEEL WORKS.

These works are fully described in the list of rolling mills and steel works beginning on page 73. A list of plants equipped for the production of open-hearth steel castings will be found on page 216. The capacities of the furnaces are given in gross ton of 2,240 pounds.

NEW HAMPSHIRE—1.

Nashua Iron and Steel Company, Nashua, Hillsborough county. One 10-gross-ton basic furnace.

MASSACHUSETTS—4.

Thomson-Houston Electric Company, Steel Foundry Department, 42 Centre st., Lynn. (Operating for the General Electric Company; general office, Schenectady, New York.) Two 15-gross-ton acid furnaces.

Tremont Nail Works, Tremont Nail Company, West Wareham, Plymouth county. One 20-gross-ton basic furnace.

Washburn and Moen Manufacturing Company, Worcester, Worcester county. One 12 and two 20-gross-ton acid furnaces and one 20-gross-ton basic furnace.

Worcester Cycle Manufacturing Company, Worcester, Worcester county. Principal office, 51 Broad st., New York. One 4 and one 10-gross-ton acid furnace. Idle and for sale or lease.

CONNECTICUT—1.

Malleable Iron Fittings Company, Branford, New Haven county. One 20-gross-ton acid furnace for steel castings.

NEW YORK—4.

Buffalo Steel Foundry, Pratt and Letchworth Company, Buffalo, Erie county. One 7 and one 9-gross-ton acid furnace.

Elmira Rolling Mills, Elmira Iron and Steel Rolling Mill Company, Elmira, Chemung county. Two 20-gross-ton basic furnaces. Idle and for sale.

Johnson (Isaac G.) & Co., Spuyten Duyvil, New York City. Two 8-gross-ton acid furnaces.

Syracuse Works, The American Steel Casting Company, Thurlow, Pa. Works at Geddes, Onondaga county. Two 10-ton Siemens acid furnaces. *See The American Steel Casting Company in Pennsylvania and Alliance Works in Ohio.*

NEW JERSEY—5.

- Benjamin (The) Atha and Illingworth Company, Harrison, Hudson county. Newark Steel Works, at Newark, Essex county. One 7 and one 12-gross-ton Siemens acid furnace.
- Carteret Steel Company, 31 Nassau st., New York City. Works at Carteret, Middlesex county. One 5-gross-ton basic experimental furnace.
- New York Switch and Crossing Company, Hoboken, Hudson county. One 6-gross-ton acid furnace. Idle and for sale.
- Passaic Rolling Mills and Bridge Works, The Passaic Rolling Mill Company, Paterson, Passaic county. New York office, 45 Broadway. Three 20-gross-ton furnaces, (two acid and one basic.)
- Trenton Steel Company, Trenton, Mercer county. One 7-gross-ton acid furnace not yet put in operation. For sale.

PENNSYLVANIA—48 COMPLETED AND 3 PROJECTED.

- Aliquippa Steel Works, Aliquippa Steel Company, 512 Times Building, Pittsburgh. Works at Aliquippa, Beaver county. One 15-gross-ton basic furnace.
- American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Works in the twenty-fourth and twenty-fifth wards, South Side. One 25-gross-ton acid and six 40-gross-ton basic furnaces.
- American (The) Steel Casting Company, principal office, Thurlow, Delaware county. Four works in Pennsylvania. Thurlow Works, at Thurlow, Delaware county; two 8 and two 20-gross-ton acid furnaces.
- Norristown Works, Norristown, Montgomery county; two 15-gross-ton acid furnaces.
- Pittsburgh Works, Twenty-sixth and Railroad sts., Pittsburgh, Allegheny county; two 20-gross-ton acid furnaces.
- Sharon Works, Sharon, Mercer county; one 12 and one 15-gross-ton acid furnace. *See Syracuse Works in New York and Alliance Works in Ohio.*
- Apollo Iron and Steel Company, Pittsburgh. Two works, one at Apollo, Armstrong county, and the other at Vandergrift, Westmoreland county. Apollo Rolling Mills, at Apollo; two 20-gross-ton acid furnaces.
- Apollo Steel Works, at Vandergrift; three 30-gross-ton acid furnaces.
- Aschman (The) Steel Casting Company, Sharon, Mercer county. One 5-gross-ton acid furnace.
- Bethlehem (The) Iron Company, South Bethlehem, Northampton county. Main office, South Bethlehem; Philadelphia office, 421 Chestnut st. Seven completed furnaces (6 acid and 1 basic) and one furnace not yet lined, (one 10, one 20, and five 40-gross-ton completed and one 40-gross-ton not lined.)
- Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. Make basic and acid open-hearth steel. Decline to give information concerning their works for the Directory.

- Braeburn Steel Company Incorporated, Braeburn, Westmoreland county. Telegraph address, Edgecliff. One 5-gross-ton basic furnace.
- Brandywine Rolling Mills, Worth Brothers Company, Coatesville, Chester county. Two 35-gross-ton furnaces, (1 acid and 1 basic.)
- Buhl Steel Company, Sharon, Mercer county. Six 30-gross-ton basic furnaces.
- Cambria Iron Company, Harrison Building, southwest cor. Fifteenth and Market streets, Philadelphia. Works at Johnstown, Cambria county. One 20-ton acid, one 20-ton basic, and two 20-gross-ton basic Wellman furnaces.
- Carbon Steel Works, Carbon Steel Company, Thirty-second st., Pittsburgh. Two 15 and six 30-gross-ton acid furnaces.
- Carnegie (The) Steel Company, Limited, general offices, Carnegie Building, Pittsburgh. Homestead Steel Works, at Munhall, one mile from Pittsburgh; one 12, six 25, eight 35, and fifteen 40-gross-ton basic furnaces.
- Chester Steel Castings Company, 407 Library st., Philadelphia. Works at Chester, Delaware county. One 15-gross-ton acid furnace; adding one 20-gross-ton acid furnace.
- Eureka Cast Steel Company, Samuel Lees, Receiver, Chester, Delaware county. Works at Lamokin, one mile south of Chester. One 20-gross-ton acid furnace.
- Fort Pitt Foundry, Mackintosh, Hemphill & Co., Pittsburgh. Works, foot of Twelfth st. Two 12-gross-ton acid furnaces.
- Frankford (The) Steel and Forging Company, Ellwood City, Lawrence county. Contemplates erecting one 10-gross-ton acid furnace.
- Franklin Steel Casting Company, Franklin, Venango county. One 15 and two 12-gross-ton Siemens acid furnaces.
- Howe, Brown & Co. Limited, Penn ave. and Seventeenth st., Pittsburgh. One 20 and one 30-gross-ton acid furnace.
- Johnson (The) Company, Johnstown, Cambria county. Principal office, Lorain, Ohio. One 2 and one 7-gross-ton acid furnace.
- Keystone Nail Works, Ellis and Lessig Steel and Iron Company Limited, Pottstown, Montgomery county. Contemplate erecting two 40-gross-ton basic furnaces.
- La Belle Steel Works, La Belle Steel Company, Pittsburgh. Works, Ridge ave. and Rebecca st., Allegheny. Two 15-gross-ton acid furnaces.
- Latrobe Works, Latrobe Steel Company, Latrobe, Westmoreland county. Main office, 1200 Girard Building, Broad and Chestnut streets, Philadelphia. Two 20-gross-ton acid furnaces. *See Melrose Park Works in Illinois.*
- Leechburg Iron Works, Kirkpatrick & Co. Limited, Leechburg, Armstrong county. Branch office, Second National Bank Building, Pittsburgh. One 20-gross-ton basic and one 30-gross-ton acid furnace.
- Linden Steel Works, Second ave., Pittsburgh. One 25 and two 15-

- gross-ton acid furnaces. Idle and for sale. Address Cephas Taylor, agent, 204 Lewis Building, Pittsburgh.
- Lukens Iron and Steel Company, Coatesville, Chester county. Two 30 and two 35-gross-ton acid and two 35-gross-ton basic furnaces.
- McKeesport Iron Works, W. Dewees Wood Company, general offices and works, McKeesport, Allegheny county. Branch office, 313 Water st., Pittsburgh. Two 15-gross-ton acid furnaces.
- Midvale (The) Steel Company, Nicetown, Philadelphia. Makes acid and basic open-hearth steel. Declines to give a description of its works for publication in the Directory.
- North Branch Steel Works, The North Branch Steel Company, Danville, Montour county. Philadelphia office, Twenty-fifth st. and Washington ave. One 10-gross-ton acid furnace.
- Pencoyd Iron Works, A. and P. Roberts Company, 261 South Fourth st., Philadelphia. Works in Montgomery county, opposite Manayunk. Nine 30-gross-ton furnaces, (8 basic and 1 acid.)
- Penn Steel Casting and Machine Company, Chester, Delaware county. Two 20-gross-ton acid furnaces.
- Pennsylvania Steel Works, The Pennsylvania Steel Company, Steelton, Dauphin county. Office, 312-19 Girard Building, Broad and Chestnut sts., Philadelphia. Two 20 and four 50-gross-ton basic furnaces, and two 6, two 25, and two 50-gross-ton acid furnaces.
- Phoenix Iron Works, Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville, Chester county. Four 20-gross-ton furnaces, (one acid and three basic.)
- Pittsburgh Steel Works, Anderson, DuPuy & Co., 8 Wood st., Pittsburgh. Works at McKees Rocks, Allegheny county, on the Pittsburgh and Lake Erie Railroad. One 20-gross-ton acid furnace.
- Pottstown Iron Works, Pottstown Iron Company, Pottstown, Montgomery county. Philadelphia office, 400 Chestnut st. One 12-gross-ton Siemens basic furnace. Idle.
- Pottsville Rolling Mills, Pottsville Iron and Steel Company, Pottsville, Schuylkill county. Two 20-gross-ton basic furnaces.
- Reliance Steel Casting Company Limited, Pittsburgh. Works, corner Thirty-sixth st. and A. V. R. R. One 5-gross-ton acid furnace.
- Schuylkill Valley (The) Steel Company. Contemplates erecting an open-hearth steel plant near Birdsboro, Berks county.
- Shoenberger Steel Company, (Juniata Iron and Steel Works,) Pittsburgh. Works, Fifteenth and Etna sts. One 12 and one 35-gross-ton acid and two 35-gross-ton basic furnaces.
- Singer, Nimick & Co., Incorporated, 83 Water st., Pittsburgh. Works in the thirty-fourth ward. One 10-gross-ton acid furnace.
- Soho Iron and Steel Works, Laughlin & Co. Limited, lessees, Pittsburgh. Works, Second ave., near Brady st. Two 15-gross-ton acid furnaces. Idle.

Solar Steel Works, William Clark Sons Company, Pittsburgh. Works, Thirty-fifth st., A. V. R. R., and Allegheny river. Two 12-gross-ton acid furnaces.

Spang (The) Steel and Iron Company, Pittsburgh. Office and works, Etna, Allegheny county. One 30 and one 12-gross-ton basic and one 12-gross-ton acid furnace. Idle and for sale.

Standard (The) Steel Works, Harrison Building, Philadelphia. Works at Burnham, Mifflin county. Two 12-gross-ton Wellman revolving acid furnaces.

Totten and Hogg Iron and Steel Foundry Company, Twenty-fourth st. and A. V. R. R., Pittsburgh. One 15-gross-ton acid furnace. Idle.

Wellman Steel Works, Thurlow, Delaware county. Two 15 and two 20-gross-ton acid furnaces. Idle and for sale. Address Samuel A. Crozer, Upland, Delaware county, Pa.

West Penn Steel Works, Jennings Steel Company Limited, lessee, Pittsburgh. Office and works on Preble ave., Allegheny. One 10-gross-ton acid furnace.

DELAWARE—1.

Wilmington Malleable Iron Company, Wilmington, New Castle county. One 8-gross-ton Siemens furnace used for producing malleable iron castings, but can make steel castings.

KENTUCKY—2.

Mitchell, Tranter & Co., Second and Elm sts., Cincinnati. Works at Covington, Kenton county. One 7-gross-ton Siemens acid furnace.

Watts (The) Steel and Iron Syndicate Limited, Middlesborough, Bell county. Seven 25-gross-ton basic furnaces, (4 completed and 3 partly completed.)

ALABAMA—3.

Alabama Steel Works, (incorporated,) Fort Payne, DeKalb county. Two 15-gross-ton basic furnaces.

Birmingham Rolling Mills, Birmingham Rolling Mill Company, Birmingham, Jefferson county. Two Siemens 30-gross-ton basic furnaces.

Jefferson Steel and Manufacturing Company, Birmingham, Jefferson county. One 15-gross-ton basic furnace. Idle and for sale or lease.

OHIO—10 COMPLETED AND 3 PROJECTED.

Etna-Standard Iron and Steel Company, Bridgeport, Belmont county. Contemplates erecting an open-hearth steel plant at Mingo Junction, Jefferson county.

Alliance Works, The American Steel Casting Company, Thurlow, Pa. Works at Alliance, Stark county. One 6 and three 15-gross-ton acid furnaces. *See Syracuse Works in New York and The American Steel Casting Company in Pennsylvania.*

Burgess Steel and Iron Works, Portsmouth, Scioto county. One 40-gross-ton acid and two 25-gross-ton basic furnaces.

Canton Steel Works, Canton Steel Company, Canton, Stark county. General office, corner Twenty-first and Liberty sts., Pittsburgh, Pa. Two 10-gross-ton acid furnaces.

Cleveland Rolling Mill Company, Western Reserve Building, Cleveland. Works chiefly located at Newburgh, Cuyahoga county. Two 15-gross-ton basic furnaces.

Cleveland (The) Steel Casting Company, 14 Winter st., Cleveland, Cuyahoga county. Works on Hubbard st. and the Cleveland and Pittsburgh Railroad. One 15-gross-ton acid furnace.

Cleveland (The) Steel Company, Cleveland, Cuyahoga county. Two 15-gross-ton furnaces, one basic and one acid.

Coe, Powers & Co., lessees, Findlay, Hancock county. One 8 and one 12-gross-ton basic furnace.

Lima (The) Locomotive and Machine Company, Lima, Allen county. One completed 10-gross-ton acid furnace and one 10-gross-ton acid furnace building.

Newark Weldless Tube and Steel Company, Newark, Licking county. Contemplates erecting a basic furnace.

Ohio Iron Company, Zanesville, Muskingum county. One 10-gross-ton acid furnace.

Ohio (The) Steel Company, Youngstown, Mahoning county. Contemplates erecting several basic furnaces.

Otis (The) Steel Company Limited, Cleveland, Cuyahoga county. Seven open-hearth steel furnaces, (two 18 and one 10-gross-ton acid and four 18-gross-ton basic.)

INDIANA—5 COMPLETED AND 1 PROJECTED.

American (The) Tin Plate Company, Elwood, Madison county. Contemplates erecting an open-hearth steel plant at Elwood.

Gould Steel Company, 66 Broadway, New York City. Works at Anderson, Madison county. Two 15-gross-ton acid furnaces.

Hinson and Hurford Steel Casting Company, Monadnock Building, Chicago. Works at Converse, Miami county. One 15-gross-ton acid furnace.

Midland Steel Company, Muncie, Delaware county. One 35-gross-ton basic and one 35-gross-ton acid furnace.

National Steel Castings Company, Montpelier, Blackford county. One 10-gross-ton Siemens acid furnace.

Premier Steel Company, Indianapolis, Marion county. Two 15-gross-ton basic furnaces. (In litigation; works idle; to be sold; date of sale uncertain.)

ILLINOIS—8.

American Steel Foundry Company, Wells Building, St. Louis. Works

at Granite City, Madison county. Three modified Siemens 10-gross-ton basic furnaces.

Granite City Steel Company, cor. Cass ave. and Second st., St. Louis, Mo. Works at Granite City, Madison county. Two 25-gross-ton Siemens basic furnaces. Contemplates erecting one additional 25-gross-ton Siemens acid furnace.

Illinois Steel Company, Rookery Building, Chicago. Open-hearth furnaces at South Works only, at South Chicago. Ten furnaces, one acid and nine basic, (one 25-gross-ton Siemens acid, four 50 and two 25-gross-ton basic Wellman rolling, and three 25-gross-ton basic Siemens furnaces.)

Melrose Park Works, Latrobe Steel Company. Chicago office, Old Colony Building; main office, 1200 Girard Building, Philadelphia. Works at Melrose Park, Cook county. One 10 and one 12-gross-ton acid furnace. *See Latrobe Works in Pennsylvania.*

Norton Brothers, 813 Masonic Temple, Chicago. Works at Maywood, Cook county. One 6-gross-ton acid furnace.

Sargent (The) Company, 675 Old Colony Building, Chicago. Works at Fifty-ninth and Wallace streets. One 12-gross-ton acid Siemens furnace.

Springfield Iron Company's Iron and Steel Works, The Springfield Iron Company, Springfield. Chicago office, Old Colony Building. Two 20-gross-ton Siemens-Pernot acid furnaces and one Pernot furnace for dephosphorizing pig metal.

Sylvan Steel Company, Moline, Rock Island county. One 5-gross-ton basic furnace.

MICHIGAN—1.

Muskegon Rolling Mills, Michigan Iron and Steel Company, Muskegon, Muskegon county. One 20-gross-ton basic furnace.

WISCONSIN—3.

Dutcher (The J. A. and P. E.) Company, Milwaukee, Milwaukee county. One 3-gross-ton Wellman rotary acid furnace.

Milwaukee Steel Casting Company, Milwaukee, Milwaukee county. One 6,000-lb. acid furnace.

Shaw (The) Steel Casting Company, Milwaukee, Milwaukee county. One 1-gross-ton acid furnace.

MINNESOTA—1 COMPLETED AND 1 PROJECTED.

Ironton (The) Structural Steel Company, main office, 29 Broadway, New York. Works at Duluth, St. Louis county, Minn. One 20-gross-ton acid furnace.

Minnesota Iron and Steel Company, 115 Temple Court, Minneapolis. Works at Columbia Heights, Anoka county. Contemplates erecting two 15-gross-ton basic furnaces.

MISSOURI—1.

Shickle, Harrison, and Howard Iron Company, Twelfth st., near Cho-teau ave., St. Louis. Three 8-gross-ton basic furnaces.

WYOMING—1 PROJECTED.

Laramie Rolling Mills, The Laramie Iron and Steel Company, lessee, Laramie, Albany county. Contemplate building one 10-gross-ton open-hearth steel furnace; acid or basic not decided.

WASHINGTON—1 PROJECTED.

Western Iron and Steel Company, Lakeview, Pierce county. Contemplates erecting one 5-gross-ton basic open-hearth steel furnace.

CALIFORNIA—1.

Pacific Rolling Mill and Forge, The Pacific Rolling Mill Company, Mission and First sts., San Francisco. P. O. Box 2,032. Works at Potrero, San Francisco. One 5 and one 18-gross-ton acid and one 18-gross-ton basic furnace.

UNITED STATES.

Total number of open-hearth steel works in the United States in April, 1898: 99 completed and 10 projected. Number of furnaces: 281 completed, 2 building, and 3 partly built.

CRUCIBLE STEEL WORKS.

These steel works are fully described in the list of rolling mills and steel works beginning on page 73. Unless otherwise stated their product is merchant steel. A list of works equipped for the production of crucible steel castings will be found beginning on page 216.

CONNECTICUT—3.

Collins Company, Collinsville, Hartford county. Four 2-pot steel-melting holes and one 24-pot Siemens furnace; 32 pots; product consumed wholly by the company in the production of "Collins" edge tools, steel plows, etc.

Farist (The) Steel Company, Bridgeport, Fairfield county. One 24-pot Siemens furnace.

Windsor Locks Steel Works, Farist & Windsor, Bridgeport. Works at Windsor Locks, Hartford county. Ten 4-pot steel-melting holes; 40 pots. Idle and for sale.

NEW YORK—4.

Chrome Steel Works, Brooklyn, Kings county. Office and works, Kent ave. and Keap and Hooper sts. New York office, 11 Pine st. Nine 6-pot steel-melting holes; 54 pots; product, tool steel and burglar-proof welded chrome steel, 5-ply, for safes, jails, etc.; also adamantine shoes and dies for crusher stamp mills and crucible chrome steel castings.

Johnson (Isaac G.) & Co., Spuyten Duyvil, New York City. Four 5-pot steel-melting holes; 20 pots; product, steel castings.

Monhagen Steel Works, Wheeler, Madden, and Clemson Manufacturing Company, Middletown, Orange county. Operated by the National Saw Company; general office, Newark, New Jersey. Forty-eight 2-pot crucible steel-melting holes; 96 pots; product, saw steel.

Sanderson Brothers Steel Company, Syracuse, Onondaga county. Two 30-pot and four 12-pot Siemens gas steel-melting furnaces; 108 pots.

NEW JERSEY—6.

Benjamin (The) Atha and Illingworth Company, Harrison, Hudson county. Two works: Newark Steel Works, at Newark; two 30-pot Siemens crucible steel-melting furnaces. Harrison Works, at Harrison; one 30-pot crucible furnace. Total number of pots, 90.

Heller & Brothers Steel Works, Heller & Brothers, Newark, Essex county. Eighteen 2-pot crucible steel-melting holes; 36 pots; product used by the firm in making rasps, files, and other tools.

Ludlum (The) Steel and Spring Company, Pompton, Passaic county. Twenty-four crucible steel-melting furnaces; 48 pots; product, crucible cast steel and railway car springs. (Formerly operated by the Pompton Steel and Iron Company.) *See page 86.*

New York Switch and Crossing Company, Hoboken. Three 6-pot crucible steel-melting holes; 18 pots; product, special castings for horse, electric, cable, and steam railroads. Idle and for sale.

Spaulding and Jennings (The) Company, (West Bergen Steel Works,) Jersey City, Hudson county. Telegraph address, West Bergen. Twenty-four 4-pot crucible steel-melting holes; 96 pots.

PENNSYLVANIA—21 COMPLETED AND 1 PROJECTED.

Aliquippa Steel Works, Aliquippa Steel Company, 512 Times Building, Pittsburgh. Works at Aliquippa, Beaver county. One 36 and one 24-pot crucible steel-melting furnace; 60 pots.

Beaver Falls Steel Works, Beaver Falls, Beaver county. One 24-pot crucible steel-melting furnace.

Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. Decline to give information concerning their works. Make crucible steel.

Braeburn Steel Company Incorporated, Braeburn, Westmoreland county. Telegraph address, Edgecliff. One 24-pot crucible steel-melting furnace.

Carpenter Steel Company, Reading, Berks county. New York office, No. 1 Broadway. One 30-pot gas-fired steel-melting furnace and 40 four-pot direct-fired steel-melting holes; 190 pots; product, steel for tools, cutlery, springs, projectiles, etc. *See Diamond Steel Works.*

Crescent Steel Works, Crescent Steel Company, 242-44 First ave., Pittsburgh. Works, Forty-ninth to Fifty-first sts. One 60-pot, two 36-pot, and two 24-pot crucible steel-melting furnaces; 180 pots.

Cyclops Steel Works, Charles Burgess, Titusville, Crawford county. Six 6-pot steel-melting holes; 36 pots.

Diamond Steel Works, Carpenter Steel Company, lessee, Reading, Berks county. Twenty 4-pot direct-fired crucible steel-melting holes; 80 pots; product, special steel for tools, dies, and projectiles. *See Carpenter Steel Company.*

Fairmount Steel Works, Alexander Foster & Co., 2325 Spring Garden st., Philadelphia. Six 4-pot steel-melting furnaces; 24 pots; product, frog plates and points, forgings, etc.

Firth-Sterling Steel Company, Westinghouse Building, Pittsburgh. Works at Demmler, Allegheny county. Two 24-pot crucible steel-melting furnaces; 48 pots; product, fine crucible tool steel and Wheeler-Sterling armor-piercing projectiles.

Howe, Brown & Co. Limited, Penn ave. and Seventeenth st., Pittsburgh. Six 24 and two 30-pot crucible steel-melting furnaces; 204 pots.

Hussey, Binns & Co. Limited, 64 Fourth avenue, Pittsburgh. One 24-pot crucible steel-melting furnace; product, crucible cast steel used by the firm in making shovels, spades, and scoops.

Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, (incorporated,) Tacony, Philadelphia. One 30-pot and three 24-pot crucible steel-melting furnaces; 102 pots; product, principally saw steel of every description, engravers' plates, and sheet steel for all other purposes.

La Belle Steel Works, La Belle Steel Company, Pittsburgh. Works, Ridge ave. and Rebecca st., Allegheny. One 36-pot and two 42-pot crucible steel-melting furnaces; 120 pots.

Midvale (The) Steel Company, Nicetown, Philadelphia. This company declines to give a description of its works for publication in the Directory. Makes crucible steel.

Pittsburgh Steel Works, Anderson, DuPuy & Co., 8 Wood st., Pittsburgh. Works at McKees Rocks, on the Pittsburgh and Lake Erie Railroad. Two 33-pot crucible steel-melting furnaces; 66 pots.

Pittsburgh Tool Steel Company, 512 Smithfield st., Pittsburgh. Works at Greensburg. One 12-pot crucible steel-melting furnace. Idle.

Reliance Steel Casting Company Limited, Pittsburgh. Works, corner

Thirty-sixth st. and A. V. R. R. One 24-pot crucible steel-melting furnace; product, steel castings.

Schuylkill Valley (The) Steel Company. Contemplates erecting a crucible steel plant near Birdsboro, Berks county.

Singer, Nimick & Co., Incorporated, 83 Water st., Pittsburgh. Works in the thirty-fourth ward. Product, rolled and hammered merchant steel; annual capacity, 12,000 gross tons of crucible products.

Wayne Iron and Steel Works, Brown & Co., Incorporated, Pittsburgh. Works, cor. Tenth st. and Duquesne Way. One 36-pot and seven 18-pot crucible steel-melting furnaces; 162 pots.

Williams (The) Company Limited, Carnegie, Allegheny county. Eight crucible steel-melting holes; 32 pots; product, hammered crucible steel.

MARYLAND—1.

Cumberland Steel and Tin Plate Company, Cumberland, Allegany county. One 24-pot crucible steel-melting furnace.

TENNESSEE—1.

Southern (The) Steel Works, John Leighton & Sons, 610-14 Boyce st., Chattanooga. Two 8-pot crucible steel-melting furnaces; 16 pots; product, tool steel, forgings, and steel castings.

OHIO—2.

Burgess Steel and Iron Works, Portsmouth, Scioto county. One 24-pot crucible steel-melting furnace.

Eagle (The) Crucible Steel Company, Canton, Stark county. Twelve 2-pot crucible steel-melting holes; 24 pots; product, tool steel, wire-drawing plates, and steel castings.

INDIANA—1.

Oliver Chilled Plow Works, South Bend Iron Works, proprietors, South Bend, St. Joseph county. 96 pots. Entire product used by the works in the manufacture of plows.

ILLINOIS—1.

Sargent (The) Company, 675 Old Colony Building, Chicago. Works at Fifty-ninth and Wallace streets. One 24-pot Siemens steel-melting furnace; product, brake shoe inserts and general castings.

MICHIGAN—1.

Detroit Steel and Spring Works, The Detroit Steel and Spring Company, Detroit. One 30-pot crucible steel-melting furnace.

WISCONSIN—3.

Dutcher (The J. A. and P. E.) Company, Milwaukee, Milwaukee county. Six 6-pot Noble's liquid fuel crucible steel-melting furnaces; 36 pots; product, chiefly bicycle and machinery castings.

Milwaukee Steel Casting Company, Milwaukee, Milwaukee county.

Two crucible steel-melting furnaces; 24 pots; product, steel castings.

Shaw (The) Steel Casting Company, Milwaukee, Milwaukee county.

Four crucible steel-melting furnaces with 3 chambers each; 18 holes can be used at a time; product, steel castings.

KANSAS—1.

Kansas City Steel and Iron Works, Nathan Schee, 3712 Fourth st., Des Moines, Iowa. Works at Argentine, Wyandotte county. One 18-pot crucible steel-melting furnace; product, fine crucible steel castings.

UNITED STATES.

Total number of crucible steel works in the United States in April, 1898: 45 completed and 1 projected. Number of pots which can be used at each heat in completed works: 2,952.

STEEL CASTING WORKS.

A complete list of all works which are equipped for the manufacture of Bessemer, open-hearth, crucible, and "special" steel castings is given below. These works are fully described in the list of rolling mills and steel works beginning on page 73. Capacities are given in gross tons of 2,240 pounds and have been furnished by the manufacturers.

MASSACHUSETTS—2.

Thomson-Houston Electric Company, Steel Foundry Department, 42 Centre st., Lynn. (Operating for the General Electric Company; general office, Schenectady, New York.) Acid open-hearth steel castings; annual capacity, 5,000 gross tons.

Worcester Cycle Manufacturing Company, Worcester, Worcester county. Acid open-hearth steel castings. Idle and for sale or lease.

CONNECTICUT—1.

Malleable Iron Fittings Company, Branford, New Haven county. Acid open-hearth steel castings for machinery, bicycle, and gun work; annual capacity, 3,000 gross tons.

NEW YORK—4.

Buffalo Steel Foundry, Pratt and Letchworth Company, Buffalo, Erie county. Acid open-hearth steel castings.

Chrome Steel Works, Brooklyn, Kings county. Office and works, Kent ave. and Keap and Hooper sts. New York office, 11 Pine st. Crucible chrome steel castings.

Johnson (Isaac G.) & Co., Spuyten Duyvil, New York City. Crucible and acid open-hearth steel castings; annual capacity, 180 gross tons of crucible and 3,600 tons of open-hearth steel castings.

Syracuse Works, The American Steel Casting Company, Thurlow, Pa. Works at Geddes, Onondaga county. Acid open-hearth steel castings; annual capacity, 3,000 gross tons. *See The American Steel Casting Company in Pennsylvania and Alliance Works in Ohio.*

NEW JERSEY—5.

Benjamin (The) Atha and Illingworth Company, Harrison. Newark Steel Works, at Newark. Acid open-hearth steel castings.

Carteret Steel Company, 31 Nassau st., New York City. Works at Carteret, Middlesex county. Experimental works.

New York Switch and Crossing Company, Fifteenth and Madison sts., Hoboken, Hudson county. Acid open-hearth and crucible steel castings for horse, electric, cable, and steam railroads; annual capacity, 3,000 gross tons of open-hearth and 1,000 tons of crucible steel castings. Idle and for sale.

Taylor Iron and Steel Company, High Bridge, Hunterdon county. Hadfield's manganese, chrome, and other steel castings.

Trenton Steel Company, Trenton. Acid open-hearth cast steel vises. For sale.

PENNSYLVANIA—20.

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Works in the twenty-fourth and twenty-fifth wards, South Side. Acid open-hearth steel castings; annual capacity, 2,500 gross tons.

American (The) Steel Casting Company, principal office, Thurlow, Delaware county. Four works in Pennsylvania, all of which produce acid open-hearth steel castings only. Thurlow Works, at Thurlow; annual capacity, 10,000 gross tons. Norristown Works, at Norristown, Montgomery county; annual capacity, 5,400 tons. Pittsburgh Works, at Pittsburgh, Allegheny county; annual capacity, 12,000 tons. Sharon Works, at Sharon, Mercer county; annual capacity, 9,000 tons. *See Syracuse Works in New York and Alliance Works in Ohio.*

Aschman (The) Steel Casting Company, Sharon, Mercer county. Acid open-hearth steel castings; annual capacity, 3,600 gross tons.

Bethlehem Iron Company, South Bethlehem, Northumberland county. Main office, South Bethlehem; Philadelphia office, 421 Chestnut st. Bessemer and open-hearth steel castings.

Carnegie (The) Steel Company, Limited, general offices, Carnegie Building, Pittsburgh. Homestead Steel Works, at Munhall, one mile from Pittsburgh. Basic open-hearth steel castings.

Chester Steel Castings Company, 407 Library st., Philadelphia. Works at Chester, Delaware county. Acid open-hearth steel castings of

- every description from 1 to 40,000 lbs.; also produces castings by the McHaffie process; annual capacity, single turn, 7,000 gross tons.
- Eureka Cast Steel Company, Samuel Lees, Receiver, Chester, Delaware county. Works at Lamokin, one mile south of Chester. Acid open-hearth steel castings; annual capacity, 5,000 gross tons. The company also produces "Eureka Steel" castings; annual capacity, 700 gross tons. Specialties, all forms of railroad and machinery castings.
- Fort Pitt Foundry, Mackintosh, Hemphill & Co., Pittsburgh. Works, foot of Twelfth st. Acid open-hearth steel castings; annual capacity, 15,000 gross tons.
- Franklin Steel Casting Company, Franklin, Venango county. Acid open-hearth steel castings; annual capacity, 8,000 gross tons. Specialties, M. C. B. automatic couplers, draft boxes, and truck bolsters.
- Johnson (The) Company, Johnstown, Cambria county. Principal office, Lorain, Ohio. Acid open-hearth steel castings; annual capacity, 6,500 gross tons of street railroad specialties.
- Midvale (The) Steel Company, Nicetown, Philadelphia. Open-hearth and crucible steel castings.
- Penn Steel Casting and Machine Company, Chester, Delaware county. Acid open-hearth steel castings; annual capacity, single turn, 6,500 gross tons. Also manufactures cast steel pipe.
- Pennsylvania Steel Works, The Pennsylvania Steel Company, Steelton, Dauphin county. Office, 312-19 Girard Building, Broad and Chestnut sts., Philadelphia. Open-hearth steel castings.
- Phoenix Iron Works, Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville, Chester county. Open-hearth steel castings.
- Reliance Steel Casting Company Limited, Pittsburgh. Works, corner Thirty-sixth st. and A. V. R. R. Crucible and acid open-hearth steel castings; annual capacity, single turn, 1,500 gross tons.
- Standard (The) Steel Works, Harrison Building, Philadelphia. Works at Burnham, Mifflin county. Acid open-hearth steel castings.
- Totten and Hogg Iron and Steel Foundry Company, 24th st. and A. V. R. R., Pittsburgh. Acid open-hearth steel castings. Furnace idle.

DELAWARE—1.

- Wilmington Malleable Iron Company, Wilmington, New Castle county. Malleable iron castings, but can make open-hearth steel castings.

TENNESSEE—1.

- Southern (The) Steel Works, John Leighton & Sons, 610-14 Boyce st., Chattanooga, Hamilton county. Crucible steel castings.

OHIO—6.

- Alliance Works, The American Steel Casting Company, Thurlow, Pa.

Works at Alliance, Stark county. Acid open-hearth steel castings; annual capacity, 12,000 gross tons. *See Syracuse Works in New York and The American Steel Casting Company in Pennsylvania.*

Cleveland (The) Steel Casting Company, 14 Winter st., Cleveland, Cuyahoga county. Works on Hubbard st. and the Cleveland and Pittsburgh Railroad. Acid open-hearth steel castings; annual capacity, 9,500 gross tons.

Coe, Powers & Co., lessees, Findlay, Hancock county. Basic open-hearth steel castings.

Eagle (The) Crucible Steel Company, Canton, Stark county. Crucible steel castings.

Lima (The) Locomotive and Machine Company, Lima, Allen county. Acid open-hearth steel castings; annual capacity, 6,000 gross tons.

Otis (The) Steel Company Limited, Cleveland, Cuyahoga county. Acid open-hearth steel castings; annual capacity, 3,700 gross tons.

INDIANA—3.

Gould Steel Company, 66 Broadway, New York City. Works at Anderson, Madison county. Acid open-hearth steel castings; annual capacity, 9,000 gross tons.

Hinson and Hurford Steel Casting Company, Monadnock Building, Chicago. Works at Converse, Miami county. Acid open-hearth National car couplers, National continuous platform buffers, and other steel castings; annual capacity, 7,500 gross tons.

National Steel Castings Company, Montpelier, Blackford county. Acid open-hearth steel car couplers, knuckles, and other castings; annual capacity, 5,000 gross tons. Specialty, railroad and electric castings.

ILLINOIS—3.

American Steel Foundry Company, Wells Building, St. Louis, Mo. Works at Granite City, Madison county. Basic open-hearth steel railway and other large castings; annual capacity, 20,000 gross tons.

Melrose Park Works, Latrobe Steel Company. Chicago office, Old Colony Building; main office, 1200 Girard Building, Philadelphia. Works at Melrose Park, Cook county. Acid open-hearth steel automatic car couplers and other castings.

Sargent (The) Company, 675 Old Colony Building, Chicago. Works at Fifty-ninth and Wallace streets. Crucible and open-hearth steel castings. Annual capacity, 900 gross tons of crucible brake shoe inserts and general castings and 4,500 tons of acid open-hearth castings.

MICHIGAN—1.

Detroit Steel and Spring Works, The Detroit Steel and Spring Company, Michigan and Hubbard avenues, Detroit. Robert-Bessemer steel castings; may make small crucible steel castings.

WISCONSIN—3.

Dutcher (The J. A. and P. E.) Company, Milwaukee. Crucible and acid open-hearth steel castings, chiefly for bicycle and machinery purposes; annual capacity, 2,500 gross tons.

Milwaukee Steel Casting Company, Milwaukee. Crucible and acid open-hearth steel castings; annual capacity, 1,100 gross tons.

Shaw (The) Steel Casting Company, Milwaukee. Crucible and acid open-hearth steel castings; annual capacity, 750 gross tons.

MISSOURI—1.

Shickle, Harrison, and Howard Iron Company, Twelfth st., near Choctau ave., St. Louis. Basic open-hearth steel castings; product, car couplers, car bolsters, car trucks, and general railway and machine castings; annual capacity, 9,000 gross tons.

KANSAS—1.

Kansas City Steel and Iron Works, Nathan Schee, 3712 Fourth st., Des Moines, Iowa. Works at Argentine, Wyandotte county. Crucible steel castings; annual capacity, 1,250 gross tons. Idle; may resume operations in 1898.

CALIFORNIA—1.

Pacific Rolling Mill and Forge, The Pacific Rolling Mill Company, Mission and First sts., San Francisco. P. O. Box 2,032. Works at Potrero, San Francisco. Open-hearth steel castings.

UNITED STATES.

Total number of steel casting works in the United States in April, 1898: 53.

IRON AND STEEL RAIL MILLS.

For a full description of all the rail mills mentioned below see the list of rolling mills and steel works beginning on page 73.

PENNSYLVANIA—16.

American Iron and Steel Works, Jones and Laughlins Limited, Pittsburgh. Light steel rails.

Bethlehem Iron Company, South Bethlehem, Northampton county. Main office, South Bethlehem; Philadelphia office, 421 Chestnut street. Iron rails and standard steel rails.

Cambria Iron Company, Harrison Building, Philadelphia. Works at Johnstown, Cambria county. Standard and street rails.

Carnegie Steel Company, Limited, Pittsburgh. Three works. Standard sections of steel rails; also light rails and girder rails.

Green Ridge Iron Works, Susan Spencer, Scranton, Lackawanna county. Strap rails.

Hollidaysburg Iron and Nail Company, Hollidaysburg, Blair county. Flat and small T rails.

Lackawanna Iron and Steel Company, Scranton, Lackawanna county. New York office, 52 Wall street. Two works. Light and heavy steel rails.

Montour Rolling Mills, Reading Iron Company, Reading. Works at Danville, Montour county. Iron and steel rails.

North Branch Steel Company, Danville, Montour county. Philadelphia office, Twenty-fifth street and Washington avenue. Light and heavy T and street rails.

Oliver Iron and Steel Company, Pittsburgh. Light rails.

Pennsylvania Steel Company, Steelton, Dauphin county. Office, 312-19 Girard Building, Philadelphia. Rails of all sections; also street rails.

Sharon Iron Company Limited, Sharon, Mercer county. Light T rails.

Wheatland Rolling Mill, The South Sharon Steel Company Limited, Wheatland, Mercer county. Bessemer and open-hearth girder and T rails.

MARYLAND—1.

Maryland Steel Company, Girard Building, Philadelphia. Works at Sparrow's Point, Baltimore county. Standard sections of steel rails.

VIRGINIA—1.

Virginia Nail and Iron Works, Reusens. Light T rails. Idle.

WEST VIRGINIA—1.

Riverside Iron Works, Wheeling. Light T rails.

TENNESSEE—2.

Harriman Rolling Mill, Harriman, Roane county. Twelve to 30-lb. T rails. For sale.

Knoxville Iron Company, Knoxville. Light T and street rails.

ALABAMA—5.

Alabama Rolling Mill Company, Birmingham. Light T rails.

Anniston Iron and Steel Company, Anniston. Light T rails.

Birmingham Rolling Mill Company, Birmingham. Small T rails.

Sheffield Rolling Mill Company, Sheffield. Small T rails.

Shelby Rolling Mill, Helena, Shelby county. Light T rails. For sale or lease.

OHIO—9.

Etna-Standard Iron and Steel Company, Bridgeport, Belmont county. Light T rails.

Cleveland Rolling Mill Company, Western Reserve Building, Cleveland.

Bessemer steel standard rails, girder rails, and small T and tram rails.
Columbus Iron Works, The P. Hayden Saddlery Hardware Company,
Columbus. Light T rails.

Ironton Rolling Mill, The Eagle Iron and Steel Company, Ironton,
Lawrence county. Eight to 16-lb. rails.

Johnson Company, Lorain, Lorain county. Girder and T rails.

Ohio Iron Company, Zanesville, Muskingum county. Light iron and
steel T rails.

Ohio Steel Company, Youngstown, Mahoning county. T rails.

Reeves Iron Company, Canal Dover, Tuscarawas county. Light T rails.

Union Iron and Steel Company, Youngstown. Small T rails.

INDIANA—4.

Central Iron and Steel Company, Brazil, Clay county. Light T rails.

Terre Haute Iron and Steel Company, Terre Haute, Vigo county.
Light T rails.

Union Steel Company, 415 Locust street, St. Louis, Mo. Works at
Alexandria, Madison county, Indiana. Small rails.

Wabash Iron Company, Terre Haute, Vigo county. Light T rails.

ILLINOIS—8.

Illinois Steel Company, Rookery Building, Chicago. Four works. Stand-
ard sections of steel rails.

Inland Steel Company, 1227-29 Marquette Building, Chicago. Works
at Chicago Heights. Light T rails.

McKenna Steel Working Company, Milwaukee, Wisconsin. Works at
Joliet, Illinois. Renewed steel rails by the McKenna process.

Springfield Iron Company, Springfield. Light rails.

Tudor Iron Works, 415 Locust street, St. Louis, Mo. Works at East
St. Louis, St. Clair county, Illinois. T rails.

WISCONSIN—1.

Milwaukee Works, Illinois Steel Company, Rookery Building, Chicago.
Works at Milwaukee, Wisconsin. Light rails.

KANSAS—1 BUILDING.

Kansas City Works, McKenna Steel Working Company, Milwaukee,
Wisconsin. Building works at Kansas City, Wyandotte county, Kan-
sas. Renewed steel rails by the McKenna process.

COLORADO—1.

Colorado Fuel and Iron Company, Pueblo. Principal office, Boston
Building, Denver. Standard steel rails and mine rails.

WYOMING—1.

Laramie Iron and Steel Company, Laramie, Albany county. Mine rails.

CALIFORNIA—1.

Pacific Rolling Mill Company, San Francisco. Iron and steel rails.

UNITED STATES.

Total number of mills in the United States in April, 1898, which roll iron and steel rails: 51 completed and 1 building.

STRUCTURAL MILLS.

Works equipped for the manufacture of bridge rods, building rods, plates for bridge work, structural tubing, etc., are included in this list. All the works named below are fully described in the list of rolling mills and steel works beginning on page 73.

MAINE—1.

Portland Rolling Mill, Portland. Angle and bridge iron.

MASSACHUSETTS—2.

Franconia Iron and Steel Works, George F. Blake, Jr., lessee, Wareham, Plymouth county. Iron angles for buildings, bridges, etc.
Kinsley Iron and Machine Works, Kinsley Iron and Machine Company, Canton, Norfolk county. Building rods, etc.

NEW YORK—2.

Elmira Rolling Mills, Elmira Iron and Steel Rolling Mill Company, Elmira, Chemung county. Iron and steel angles, universal mill plates, etc. Idle and for sale.
Standard Rolling Mill, M. J. Dempsey, Fortieth st. and Eleventh ave., New York City. Iron angles for buildings, bridges, etc.

NEW JERSEY—2.

Passaic (The) Rolling Mill Company, Paterson, Passaic county. New York office, 45 Broadway. Structural material, including beams, channels, angles, tees, universal mill plates, etc. The plant includes a bridgebuilding department, with modern outfit, including steel eye-bar plant; annual capacity of bridge shops, 24,000 gross tons.
Trenton Iron Works, New Jersey Steel and Iron Company, Trenton, Mercer county. New York office, Cooper, Hewitt & Co., 17 Burling Slip. Iron and steel structural shapes, including beams, channels, angles, tees, zees, etc. Works contain a complete plant for the construction of bridges, roofs, and all kinds of iron and steel structures; annual capacity, 30,000 gross tons.

PENNSYLVANIA—27.

Allentown (The) Rolling Mills, 229 Drexel Building, Philadelphia. Allentown Rolling Mills, at Allentown, Pa. Iron I beams, channels, angles, bridge work, etc.

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Works in the twenty-fourth and twenty-fifth wards, South Side. Steel structural shapes; annual capacity of the shops for fitting structural materials, 24,000 gross tons.

Bethlehem (The) Iron Company, South Bethlehem, Northampton county. Main office, South Bethlehem; Philadelphia office, 421 Chestnut st. Iron and steel beams, tees, angles, etc.

Brandywine Rolling Mills, Worth Brothers Company, Coatesville, Chester county. Plates for tank and structural work.

Cambria Iron Company, Harrison Building, southwest cor. Fifteenth and Market streets, Philadelphia. Works at Johnstown, Cambria county. Structural shapes.

Carnegie (The) Steel Company, Limited, general offices, Carnegie Building, Pittsburgh. Three mills in Allegheny county which make structural shapes. Homestead Steel Works, at Munhall, one mile from Pittsburgh; structural shapes and bridge steel. Upper Union Mills, at Thirty-third street, Pittsburgh; structural steel. Lower Union Mills, at Twenty-ninth street, Pittsburgh; bridge work, angles, etc.

Catasauqua Manufacturing Company, Catasauqua, Lehigh county. Bridge plates, angles, etc. For sale.

Columbia (The) Iron and Steel Works, Uniontown, Fayette county. Beams, channels, angles, tees, bars, and special shapes for architectural and engineering purposes. Purchased at sheriff's sale by The Safe Deposit and Trust Company of Pittsburgh as trustee for the first mortgage bondholders. Idle and for sale.

Glasgow Iron and Steel Works, Glasgow Iron Company, Pottstown, Montgomery county. Main office, Pottstown; Philadelphia office, Fidelity Building. Iron and steel bridge plates. *See Pottstown Iron Works.*

Logan Iron and Steel Works, Logan Iron and Steel Company, Burnham, Mifflin county, 4 miles from Lewistown, on the M. & C. C. R. R. Philadelphia office, Harrison Building, southwest corner Fifteenth and Market sts. Bridge iron, angles, etc.

Lukens Iron and Steel Company, Coatesville, Chester county. Philadelphia office, Fidelity Building. Bridge iron, etc.

Mahoning Rolling Mill, Howe & Polk, lessees, Danville, Montour county. Structural tubing, covered by patents, consisting of round unwelded tubing from $\frac{1}{2}$ inch to 3 inches in diameter; also angles, channels, odd shapes, and small zee bar mouldings; annual capacity, 10,000 gross tons.

Montour Rolling Mills, Reading Iron Company, Reading. Works at Danville, Montour county. Angle iron. *See Reading Rolling Mill.*

- Oliver Iron and Steel Company, Pittsburgh. Mills and factories located Tenth to Fifteenth sts., South Side, Pittsburgh. Angles, small channels, etc.; also wide sheets for structural work.
- Pencoyd Iron Works, A. and P. Roberts Company, 261 South Fourth st., Philadelphia. Works in Montgomery county, opposite Manayunk. Open-hearth steel channel bars from 2 to 15 inches, beams from 3 to 24 inches, deck beams from 5 to 12 inches, tees from 1 to 6 inches, angles from 1 to 8 inches, flats from 1 to 12 inches wide, etc. Bridge and construction department contains equipment for all classes of bridge and architectural work; also hydraulic forge shop for manufacturing solid forged steel eye-bars from 3 to 12 inches wide.
- Penn Iron Works, Penn Iron Company Limited, Lancaster, Lancaster county. Iron for bridge work, etc.
- Pennsylvania Steel Works, The Pennsylvania Steel Company, Steelton, Dauphin county. Office, 312-19 Girard Building, Broad and Chestnut streets, Philadelphia. Steel structural shapes.
- Phoenix Iron Works, Phoenix Iron Company, 410 Walnut st., Philadelphia. Works at Phoenixville. Open-hearth steel beams, channels, angles, tees, and miscellaneous structural shapes. Construction department is prepared to erect steel buildings and bridges.
- Pottstown Iron Works, Glasgow Iron Company, lessee, Pottstown, Montgomery county. Philadelphia office, Fidelity Building. Bridge and tank plate, etc. *See Glasgow Iron and Steel Works.*
- Pottsville Rolling Mills, Pottsville Iron and Steel Company, Pottsville, Schuylkill county. Iron and steel beams, channels, angles, tees, etc.
- Reading Bolt and Nut Works, (not incorporated,) J. H. Sternbergh & Son, Reading, Berks county. Rods, plates, straps, and forgings for cars, bridges, buildings, etc.
- Reading Rolling Mill, Reading Iron Company, Reading, Berks county. Iron and steel structural shapes, including beams, channels, angles, tees, etc.; annual capacity, 45,000 gross tons. Idle. *See Montour Rolling Mills.*
- Valley Iron Works, W. W. Kurtz & Sons, Coatesville, Chester county. Philadelphia office, Bullitt Building. Iron and steel bridge plates. Idle and for sale.
- Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Incorporated, Sharpsburg, Allegheny county. Bridge iron, plates for girders, etc.
- Vulcan Forge and Iron Works, Lockhart Iron and Steel Company, Pittsburgh. Works at McKees Rocks, Allegheny county. Product, bridge iron and angle iron and steel.

DELAWARE—2.

- Diamond State Iron Company, Wilmington, New Castle county. Philadelphia office, Bourse Building. Two mills. Bridge and building rods, etc.

MARYLAND—1.

Cumberland Rolling Mill, Baltimore and Ohio Railroad Company, Cumberland, Allegany county. Main office, Mount Clare, Baltimore. Iron beams, channels, angles, tees, etc. Idle and for lease.

VIRGINIA—1.

Old Dominion Nail Works, Old Dominion Iron and Nail Works Company, Richmond, Henrico county. Works on Belle Isle, in the city of Richmond. Flat, round, and square iron for structural and bridge work.

KENTUCKY—3.

American Nut and Bolt Company, Newport, Campbell county. Iron bridge rods.

Licking Iron Works, Licking Rolling Mill Company, Covington, Kenton county. Bridge, angle, tee, jail, sash iron, etc.

Mitchell, Tranter & Co., Second and Elm sts., Cincinnati. Works at Covington, Kenton county. Iron and steel channels, angles, etc., for buildings, bridges, etc.

ALABAMA—3.

Alabama Rolling Mill Company, Birmingham, Jefferson county. Works at Gate City, Jefferson county. Angles from 1 to 2½ inches and light channels for buildings, bridges, etc.

Birmingham Rolling Mill Company, Birmingham, Jefferson county. Iron and open-hearth steel angles for bridges.

Sheffield Rolling Mill, Sheffield Rolling Mill Company, Sheffield, Colbert county. Angle iron.

OHIO—9.

Ætna-Standard Iron and Steel Company, Bridgeport. Ætna Works, at Bridgeport; angles, tees, channels, and miscellaneous shapes.

Bellaire Steel Company, Bellaire, Belmont county. Soft Bessemer steel plates for bridges, buildings, etc.

Brown Bonnell (The) Iron Company, Youngstown, Mahoning county. Beams, channels, angles, universal mill plates, etc.

Burgess Steel and Iron Works, Portsmouth, Scioto county. Iron and steel angles.

Cleveland Rolling Mill Company, Western Reserve Building, Cleveland. Works chiefly located at Newburgh, Cuyahoga county. Steel beams, channels, angles, and other structural shapes.

Mahoning Valley (The) Iron Company, Youngstown, Mahoning county. Steel angles for bridges, buildings, windmills, bedsteads, etc.

Union (The) Iron and Steel Company, Youngstown, Mahoning county. Two works. Angles and other special shapes for bridges, buildings, etc.

Union Rolling Mill Company, Cleveland, Cuyahoga county. Works and office at Newburgh, in the city of Cleveland. Bridge iron.

INDIANA—6.

Central (The) Iron and Steel Company, Brazil, Clay county. Angles, and plain, flat, and round iron for bridgebuilders.

Indiana Forge and Rolling Mill Company, 1242-48 Harrison ave., Cincinnati, Ohio. Works at New Albany, Floyd county. Structural iron.

Indiana (The) Iron Company, Muncie, Delaware county. Iron and steel bridge rods, etc.

Indiana (The) Steel Company, Indianapolis, Marion county. Beams from 6 to 20 inches. Works idle since May, 1893; to be sold.

Ohio Falls Iron Works, New Albany, Floyd county. Bridge iron. Property in the hands of George Borgeding, trustee. Idle.

Premier Steel Company, Indianapolis, Marion county. Angles, channels, miscellaneous shapes, etc. Works idle; to be sold.

ILLINOIS—2.

Inland Steel Company, 1227-29 Marquette Building, Chicago. Works at Chicago Heights, Cook county. Angles, tees, channels, etc.

Universal Construction Company, (incorporated,) Rookery Building, Chicago. Leases from the Illinois Steel Company the rolling mill and steel works at North Chicago known as the North Works. All kinds of structural work, including material for bridges and buildings.

WISCONSIN—1.

West Superior Iron and Steel Works, Wisconsin Steel Company, West Superior, Douglas county. Steel structural shapes.

MINNESOTA—1.

Ironton (The) Structural Steel Company, main office, 29 Broadway, New York. Works at Duluth, St. Louis county, Minn. Structural steel; annual capacity, 35,000 gross tons.

COLORADO—1.

Colorado (The) Fuel and Iron Company, Pueblo. Principal office, Boston Building, Denver. Works at Bessemer, near Pueblo, Pueblo county. Structural shapes; annual capacity, 50,000 gross tons.

CALIFORNIA—2. ✓

Judson Manufacturing Company, Oakland, Alameda county. Office, cor. Howard and Beale sts., San Francisco. Structural shapes.

Pacific Rolling Mill and Forge, The Pacific Rolling Mill Company, Mission and First sts., San Francisco. Works at Potrero, San Francisco. Structural shapes, including angles, beams, channels, etc.

UNITED STATES.

Total number of works in the United States in April, 1898, equipped for the manufacture of structural shapes: 66.

PLATE, SHEET, AND SKELP MILLS.

Mills that are equipped for making nail plate, tack plate, or shovel plate are also included in this list. A number of the works named below make a specialty of rolling iron plates and sheets, although they occasionally roll steel plates and sheets from purchased billets. Works making black plates, or sheets, for tinning are included in the list. For a more complete description of all the plants named below see the list of rolling mills and steel works beginning on page 73.

NEW HAMPSHIRE—1.

Nashua Iron and Steel Company, Nashua, Hillsborough county. Homogeneous steel and iron plates and steel plates.

MASSACHUSETTS—4.

Bridgewater Iron Company, Bridgewater, Plymouth county. Tack plate and yellow metal sheathing.

Mount Hope Iron Works, Mount Hope Iron Company, Somerset, Bristol county. Skelp iron, tack and shovel plate, etc.

Robinson Iron Company, Plymouth, Plymouth county. Tack plate.

Tremont Nail Works, Tremont Nail Company, West Wareham, Plymouth county. "Percha" plates for nails and tacks.

CONNECTICUT—2.

Wilmot and Hobbs (The) Manufacturing Company, Bridgeport, Fairfield county. Plate and sheet steel.

Windsor Locks Steel Works, Farist & Windsor, Bridgeport. Works at Windsor Locks, Hartford county. Tack plate, etc. Idle and for sale.

NEW YORK—6.

Chrome Steel Works, Brooklyn, Kings county. Office and works, Kent ave. and Keap and Hooper sts. New York office, 11 Pine st. Chrome steel and iron 5-ply plates for safes, jails, etc.

Elmira Iron and Steel Rolling Mill Company, Elmira, Chemung county. Universal plates from 6 to 30 inches wide and of any thickness; also plate and band iron, etc. Idle and for sale.

Monhagen Steel Works, Wheeler, Madden, and Clemson Manufacturing Company, Middletown, Orange county. Operated by the National Saw Company; general office, Newark, New Jersey. Crucible steel saw plates; annual capacity, 2,500 gross tons.

- Sanderson Brothers Steel Company, Syracuse, Onondaga county.
Hammered and rolled crucible sheet steel, etc.
- Somerton Tin Plate Works, Somers Brothers, Third st. and Third ave., Brooklyn, Kings county. Iron or steel black sheets for tinplates, from No. 26 to No. 36 gauge; annual capacity, 4,500 gross tons.
- Troy (The) Steel Company, Troy, Rensselaer county. General office, Troy; New York office, 40 Wall st. Steel sheets, skelp, etc.

NEW JERSEY—4.

- American Sheet Iron Works, American Sheet Iron Company, Phillipsburg, Warren county. Best qualities of sheet iron and sheet steel for stamping and enameling and black plates, or sheets, for tinning; annual capacity, triple turn, 2,400 gross tons of sheets and 1,400 tons of black plates.
- Cumberland Nail and Iron Company, Bridgeton, Cumberland county. Branch office, 207 Walnut Place, Philadelphia. Nail plate and skelp.
- Oxford Iron and Nail Works, Oxford, Warren county. Iron nail plate. Owned by the Delaware, Lackawanna, and Western Railroad Company, Samuel Sloan, President, 26 Exchange Place, New York; Edmund T. Lukens, Agent, Oxford. For sale.
- Passaic Rolling Mills and Bridge Works, The Passaic Rolling Mill Company, Paterson, Passaic county. New York office, 45 Broadway. Universal mill plates, etc.

PENNSYLVANIA—123 COMPLETED, 2 BUILDING, AND 1 PARTLY ERECTED.

- Aliquippa Steel Works, Aliquippa Steel Company, 512 Times Building, Pittsburgh. Works at Aliquippa, Beaver county. Special qualities of steel plates and sheets; annual capacity, 10,000 gross tons.
- American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Works in the twenty-fourth and twenty-fifth wards, South Side. Steel plates, sheets, etc.
- Anchor Nail and Tack Works and Central Expanded Metal Company, Chess Brothers, 531 Wood st., Pittsburgh. Works at Rankin Station. Light steel plates for straps, nails, tacks, stamping, and die work; annual capacity, 12,000 gross tons.
- Apollo Iron and Steel Company, Pittsburgh. Two works: Apollo Rolling Mills, at Apollo, Armstrong county; steel black sheets for galvanizing; annual capacity, 14,000 gross tons. Apollo Steel Works, at Vandergrift, Westmoreland county; steel black and galvanized sheets; annual capacity, 38,000 gross tons of black sheets and 51,000 tons of galvanized sheets.
- Atlantic Iron and Steel Company, (successor to Etna Iron Works Limited,) New Castle, Lawrence county. Skelp iron, etc.
- Beaver Falls Steel Works, Beaver Falls. Plow and cutlery steel, etc.

Bellefonte Iron and Nail Works, The Commonwealth Guarantee, Trust, and Safe Deposit Company, trustee, Harrisburg. Works at Bellefonte, Centre county. Iron nail plate. For sale or lease.

Bethlehem (The) Iron Company, South Bethlehem, Northampton county. Main office, South Bethlehem; Philadelphia office, 421 Chestnut st. Open-hearth steel ship plate, boiler plate, tank plate, forged armor plates, etc. Finishing capacity of armor-plate department, 10,000 gross tons annually.

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro, Berks county. Skelp iron.

Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. Steel plates and sheets.

Blairsville Rolling Mill and Tin Plate Company, Blairsville. Black plates, or sheets, for tinning; annual capacity, 4,500 gross tons.

Blandon Rolling Mill, Simon Seyfert, Reading. Works at Blandon, Berks county. Grooved pipe skelp. *See Gibraltar Iron Works.*

Brandywine Rolling Mills, Worth Brothers Company, Coatesville, Chester county. Steel plates for best boiler, locomotive, and tank and structural work; all sizes of machine-flanged and dished heads and machine-flanged man-holes, saddles, etc.; annual capacity, 50,000 gross tons of plates. *See Viaduct Iron Works.*

Byers (A. M.) & Co., (incorporated,) Pittsburgh. Works on Sixth st., South Side. Skelp iron, all consumed in the manufacture of pipe; annual capacity, 16,000 gross tons.

Canonsburg Iron and Steel Company, Canonsburg, Washington county. Branch office, Germania Bank Building, Pittsburgh. Finest quality of sheet iron and steel for stamping and tinning purposes; annual capacity, triple turn, 15,000 gross tons.

Carbon Steel Works, Carbon Steel Company, Thirty-second st., Pittsburgh. Acid open-hearth steel universal rolled plates and sheared plates; annual capacity, 60,000 gross tons of finished plates.

Carnegie (The) Steel Company, Limited, general offices, Carnegie Building, Pittsburgh. Three mills in Allegheny county which make plates: Homestead Steel Works, at Munhall, one mile from Pittsburgh; steel boiler, armor, ship, and tank plates; finishing capacity of armor plate department, 10,000 gross tons per annum. Upper Union Mills, at Thirty-third street, Pittsburgh, on the Allegheny Valley Railroad; steel universal mill plates, etc. Lower Union Mills, at Twenty-ninth st., Pittsburgh, on the Allegheny Valley Railroad; universal mill plates, etc.

Catasauqua Manufacturing Company, Catasauqua, Lehigh county. Two mills for rolling plates. High-grade tank, ship, bridge, and boiler plates, skelp iron or steel, etc. Idle and for sale.

Central Iron and Steel Company, Harrisburg, Dauphin county. Two works: Central Iron Works, at Harrisburg; iron and steel boiler

- plates, tank iron, and universal sheared plates of almost any size and quality required; annual capacity, 24,000 gross tons of boiler plates and 50,000 tons of universal plates. Paxton Rolling Mills, at Harrisburg; iron and steel plates; annual capacity, 48,000 gross tons.
- Chartiers (The) Iron and Steel Company Limited, Iron Exchange, Wood and Water sts., Pittsburgh. Works at Carnegie, Allegheny county. Iron and steel sheets; annual capacity, 6,000 gross tons.
- Chesapeake Nail Works, Charles L. Bailey & Co., (incorporated,) Harrisburg, Dauphin county. Iron and steel nail plate.
- Clinton Rolling Mill, Clinton Iron and Steel Company, 208 Wood st., Pittsburgh. New York office, 15 Cortlandt st. Mill on the South Side. Plate iron; annual capacity, 15,000 gross tons.
- Cold Rolled Steel Works, W. H. Nimick, Pittsburgh. Works at New Kensington, Westmoreland county. Steel tack plate. Idle and for sale.
- Columbia Rolling Mill Company, Columbia, Lancaster county. Skelp and tube iron; annual capacity, 20,000 gross tons.
- Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood and Brothers Company, Conshohocken, Montgomery county. General office, 223 North Second st., Philadelphia. Sheet, flue, and plate iron of all kinds; corrugated iron a specialty; annual capacity, 20,000 gross tons. *See Plymouth Rolling Mill.*
- Crum Lynne Iron and Steel Company, Crum Lynne, Delaware county. Grooved iron and steel skelp and charcoal boiler tube skelp.
- Danville Nail Works, C. R. Baird & Co., Bullitt Building, Philadelphia. Works at Danville, Montour county. Iron and steel nail plate. Idle and for sale or lease.
- Duncannon Iron Works, The Duncannon Iron Company, Duncannon. Office, 122 Race st., Philadelphia. Iron and steel nail plate.
- Easton Sheet Iron Works, Theodore Oliver, Easton, Northampton county. Steel and refined iron sheets; annual capacity, 1,000 gross tons.
- Elba Iron Works Department, Oil Well Supply Company, Pittsburgh. Works, Second ave., twenty-third ward. Skelp iron and steel used at the company's tube works; annual capacity, 35,000 gross tons.
- Ellwood Tin Plate Works, Ellwood Tin Plate Company, Perry-Payne Building, Cleveland, Ohio. Works at Ellwood City, Lawrence county. Iron and steel sheets, black plates for tinning, and cold-rolled steel sheets; annual capacity, triple turn, 10,000 gross tons.
- Etna Iron and Tube Works, Spang, Chalfant & Co., Pittsburgh. Office, 66-70 Sandusky st., Allegheny. Pipe iron; annual capacity, 25,000 gross tons.
- Gibraltar Iron Works, Simon Seyfert, Reading, Berks county. Boiler plate and boiler tube and pipe iron; annual capacity, 3,600 gross tons. *See Blandon Rolling Mill.*
- Glasgow Iron and Steel Works, Glasgow Iron Company, Pottstown,

- Montgomery county. Works in ninth ward. Main office, Pottstown. Philadelphia office, Fidelity Building. Iron and steel bridge, tank, and boiler plate, flanged and dished boiler heads, man-holes, man-hole saddles for boilers, buckle plates, etc.; annual capacity, 24,000 gross tons. *See Pottstown Iron Works.*
- Hamilton & Co., twenty-third ward, Pittsburgh. Works at West Newton, Westmoreland county. Black plates, all consumed in the manufacture of tin and terne plates by John Hamilton and C. W. Cadwallader; annual capacity, 4,000 gross tons.
- Harrisburg Rolling Mill Company, Harrisburg, Dauphin county. Skelp iron; annual capacity, 24,000 gross tons.
- Hollidaysburg Iron Works, Hollidaysburg Iron and Nail Company, Hollidaysburg, Blair county. Skelp, hoop iron, etc.
- Howe, Brown & Co. Limited, Penn ave. and Seventeenth st., Pittsburgh. Crucible steel sheets and plates and open-hearth steel plates for boilers, hulls of vessels, etc.; annual capacity, 7,200 gross tons of plates.
- Hughes & Patterson, Richmond and Otis sts., Kensington, Philadelphia. Iron skelp.
- Hussey, Binns & Co. Limited, 64 Fourth avenue, Pittsburgh. Crucible cast steel used by the firm in making shovels, spades, and scoops; annual capacity, 1,350 gross tons of ingots.
- Hyde Park Iron and Steel Company, Hyde Park, Westmoreland county. Fine grades of soft steel sheets for stamping, nickeling, japaning, tinning, and galvanizing, including pickled and cold rolled, open pickled, double annealed and cold rolled, and cold rolled and annealed finishes; annual capacity, triple turn, 7,500 gross tons.
- Johnstown Tinplate Works, Johnstown Tinplate Company, 69 Wall st., New York. Works at Johnstown, Cambria county. Black plates, or sheets, for tinning; annual capacity, 3,750 gross tons.
- Juniata Rolling Mill, Hollidaysburg, Blair county. Grooved skelp iron and nail plate. For sale or lease.
- Keystone Iron Works Limited, Reading, Berks county. Boiler plate, skelp, tank, chute, boat iron, etc.
- Keystone Nail Works, Ellis and Lessig Steel and Iron Company Limited, Pottstown, Montgomery county. Iron and steel shovel, tack, and nail plate, etc.; annual capacity, 14,500 gross tons of tack, nail, and shovel plate.
- Keystone Rolling Mill, Pittsburgh. Works, Second ave. near Morris st., Soho. Skelp iron. For sale or lease. Address Lindsay & McCutcheon, Allegheny, Pa.
- Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, (incorporated), Tacony, Philadelphia. Principally saw steel of every description, engravers' plates, and sheet steel for other purposes; annual capacity, 5,380 gross tons of rolled products.

- Kimberly (The P. L.) Company, Sharon, Mercer county. Atlantic Works, at Sharon. Iron plates.
- Lalanc and Grosjean Manufacturing Company, Harrisburg, Dauphin county. Main office, 19 Cliff st., New York. Sheet iron and sheet steel and black plates for tinning; annual capacity, 2,500 gross tons of sheets and 5,500 tons of black plates.
- Laufman (P. H.) & Co. Limited, Apollo, Armstrong county. Pittsburgh office, Germania Bank Building. Two works: Apollo Sheet Iron Mills, in Westmoreland county; fine sheet iron, decarbonized sheet steel, black plates for their own consumption, and American roofing plate; annual capacity, 6,000 gross tons. Saltsburg Rolling Mills, Saltsburg, Indiana county (leased from the Saltsburg Rolling Mill Company;) fine sheet iron and decarbonized sheet steel; annual capacity, 6,000 gross tons.
- Lebanon Rolling Mills, Lebanon Rolling Mill Company, Lebanon, Lebanon county. Boiler plates, sheets, skelp, etc.; annual capacity, 20,000 gross tons of plates and skelp iron.
- Leechburg Iron Works, Kirkpatrick & Co. Limited, Leechburg, Armstrong county. Branch office, Second National Bank Building, Pittsburgh. Iron and steel sheets; annual capacity, 10,800 gross tons. Also operate a planished steel department.
- Leechburg Rolling Mill, Leechburg, Armstrong county. Fine sheet steel, light plate steel, and pickled and cold-rolled plates ready for tinning; annual capacity, 6,000 gross tons. For sale or lease; address George J. Gorman, trustee, lock box 119, Pittsburgh.
- Lewisburg Rolling Mill, Lewisburg, Union county. Nail plate. Owned by James B. Bailey, Harrisburg, and Joshua B. Lessig, Pottstown. Idle and for sale or lease.
- Linden Steel Works, Second ave., Pittsburgh. Open-hearth steel boiler, tank, armor, and ship plates, sheets, etc. Idle and for sale. Address Cephas Taylor, agent, 204 Lewis Building, Pittsburgh.
- Logan Iron and Steel Company, Burnham. Philadelphia office, Harrison Building. Skelp.
- Longmead Iron Works, Longmead Iron Company, Conshohocken. Grooved skelp iron; annual capacity, 9,000 gross tons.
- Lukens Iron and Steel Company, Coatesville. All kinds of boiler and ship plates, bridge iron, and homogeneous steel plates.
- McIlvain (William) & Sons' Boiler Plate Mill, William McIlvain & Sons, Reading, Berks county. Every variety of steel and iron plates; annual capacity, 9,000 gross tons. For sale.
- McKeesport Iron Works, W. Dewees Wood Company, general offices and works, McKeesport, Allegheny county. Branch office, 313 Water st., Pittsburgh. Sheet iron and sheet steel, both black and planished; annual capacity, 30,000 gross tons of rolled and forged products. Specialty, patent planished sheet iron.

- Milton Nail Works, F. A. Godcharles Company, Milton, Northumberland county. Iron and steel nail plate.
- Monongahela Tin Plate Company, 921-23 Carnegie Building, Pittsburgh. Works on South Fifteenth st. Black plates, or sheets, for tinning.
- Montour Rolling Mills, Reading Iron Company, Reading. Works at Danville, Montour county. Grooved skelp iron. *See Reading Iron Company.*
- Myers (The H. M.) Company, Beaver Falls, Beaver county. New York export office, 9 Stone st. Rolled shovel blanks used by the company in its shovel works; annual capacity, 1,200 gross tons.
- National Tin Plate Company of Pennsylvania, Monessen, Westmoreland county. Black plates, or sheets, for tinning; annual capacity, 25,000 gross tons.
- National Tube Works Company, McKeesport, Allegheny county. Charcoal boiler tube irons and pipe irons and steel. *See Republic Iron Works.*
- Neshannock Sheet and Tin Plate Company, New Castle, Lawrence county. Black plates for tinning; annual capacity, 12,000 gross tons.
- New Castle Steel and Tin Plate Company, (incorporated,) New Castle, Lawrence county. Black plates consumed in the company's tinplate plant; annual capacity, triple turn, 40,000 gross tons.
- Norristown Iron Works, Executors Estate of James Hooven, Norristown, Montgomery county. Skelp iron, part of which is made by the works into butt-welded pipes and the remainder sold; annual capacity, 5,000 gross tons. For sale or lease.
- North Branch Steel Works, The North Branch Steel Company, Danville, Montour county. Philadelphia office, Twenty-fifth st. and Washington ave. Steel boiler, ship, and tank plates, sheared skelp iron, etc.; annual capacity, 11,000 gross tons of plates and skelp iron.
- Northumberland Iron and Nail Works, Van Alen & Co., Northumberland, Northumberland county. Iron and steel nail plate.
- Ohio River (The) Sheet and Tinplate Company, Agnew, Beaver county. Works at Remington Station, P., F. W., & C. R. R. (Remington Station is not a post office.) Sheet iron and black plates for tinning; annual capacity, triple turn, 4,300 gross tons.
- Old Meadow Rolling Mill Company, Scottdale, Westmoreland county. Building a rolling mill at Scottdale. Product to be sheet iron; annual capacity, 12,000 gross tons. Expects to have works completed and in operation in July, 1898.
- Oliver Iron and Steel Company, Pittsburgh. Mills and factories located Tenth to Fifteenth sts., South Side, Pittsburgh. Iron and steel plates, and wide sheets for skelp iron, tanks, structural work, etc.
- Oxford Iron and Steel Works, William & Harvey Rowland Incorporated, Frankford, Philadelphia. Bessemer and open-hearth steel sheets.

- Parkesburg Iron Works, The Parkesburg Iron Company, Parkesburg, Chester county. Boiler tube skelp iron; annual capacity, 11,000 gross tons.
- Pennsylvania Steel Works, The Pennsylvania Steel Company, Steelton. Office, 312-19 Girard Building, Broad and Chestnut sts., Philadelphia. Bessemer steel plates, open-hearth steel boiler plates, etc.
- Pennsylvania Tin Plate Company, New Kensington, Westmoreland county. New York office, Temple Court. Fine sheet steel and black plates for tinning.
- Penn Treaty Iron Works, Marshall Brothers & Co., Beach and Marlborough sts., Philadelphia. Steel sheets and black plates for tinning; annual capacity, 7,500 gross tons.
- Pine Iron Works, Joseph L. Bailey, Pine Iron Works P. O., Berks county; telegraph address, Manatawny Station. Iron and steel plates of all kinds; annual capacity, 5,000 gross tons.
- Pittsburgh Iron and Steel Works, J. Painter and Sons Company, Pittsburgh. Works on the South Side. Steel skelp.
- Pittsburgh Steel Works, Anderson, DuPuy & Co., 8 Wood st., Pittsburgh. Works at McKees Rocks, Allegheny county, on the Pittsburgh and Lake Erie Railroad. Crucible and open-hearth plow, saw, sheet, and plate steel, etc.
- Pittsburgh Tin Plate Works, New Kensington, Westmoreland county. Soft stamping sheets and black plates for tinning; annual capacity, 13,200 gross tons.
- Plymouth Rolling Mill, J. Wood and Brothers Company, lessee, Conshohocken, Montgomery county. Iron and steel plates and sheets; annual capacity, 10,500 gross tons. *See Conshohocken, Pennsylvania, and Corliss Iron Works.*
- Pottsgrove Iron Works, Potts Brothers Iron Company Limited, Pottstown, Montgomery county. Boiler plate, tank, flue, and pipe iron; annual capacity, 11,000 gross tons. Specialties, pipe and flue iron.
- Pottstown Iron Works, Glasgow Iron Company, lessee, Pottstown, Montgomery county. Philadelphia office, Fidelity Building. Boiler, ship, bridge, tank, universal mill plates, etc.; annual capacity, 50,000 gross tons of plates. *See Glasgow Iron and Steel Works.*
- Reading Bolt and Nut Works, (not incorporated,) J. H. Sternbergh & Son, Reading, Berks county. Plates for cars, bridges, buildings, etc.
- Reading Iron Company, Reading, Berks county. Plain, sheared, and grooved skelp and plate iron; annual capacity, 48,000 gross tons. *See Montour Rolling Mills.*
- Republic Iron Works Department of National Tube Works Company, Twenty-fifth st., South Side, Pittsburgh. Boiler tube and pipe iron and sheet and plate iron; annual capacity, 37,000 gross tons of boiler tube and pipe iron, 7,300 tons of sheet iron, and 7,000 tons of plate iron. *See National Tube Works Company.*

- Sable Iron Works, Zug & Co. Limited, Pittsburgh. Works, Thirteenth and Etna sts. Black plates for tinning, and steel and iron sheets for corrugating, galvanizing, stamping, expanded metal, and electric work; annual capacity, 7,000 gross tons of sheets.
- Schuylkill Iron Works, Alan Wood Company, 519 Arch st., Philadelphia. Works at Conshohocken, Montgomery county. Iron and steel plates and sheets; annual capacity, 20,000 gross tons.
- Scottdale Iron and Steel Company Limited, Scottdale, Westmoreland county. Iron and steel sheets; annual capacity, triple turn, 17,000 gross tons.
- Seyfert Rolling Mills, Samuel R. Seyfert & Brother, Reading, Berks county. Works at Seyfert Station, W. & N. R. R. Iron boiler-tube skelp, pipe skelp, etc.; annual capacity, 15,000 gross tons of skelp iron. For sale.
- Sharon Iron Company Limited, Sharon, Mercer county. Iron and steel sheets, tank plate, etc.
- Shenango Valley Tinplate Works, Shenango Valley Steel Company, New Castle, Lawrence county. Building. Will make black plates, or sheets, for tinning; annual capacity, 60,000 gross tons.
- Shoenberger Steel Company, (Juniata Iron and Steel Works,) Pittsburgh. Works, Fifteenth and Etna sts. Basic and acid open-hearth steel plates, sheet steel, skelp steel, etc.
- Singer, Nimick & Co., Incorporated, 83 Water st., Pittsburgh. Works in the thirty-fourth ward. Saw, sheet, plate, and agricultural steel.
- Sligo Rolling Mills, Phillips, Nimick & Co., Pittsburgh. Works on the South Side, below the Monongahela bridge. Iron plates and sheets; boiler plates a specialty.
- Soho Iron and Steel Works, Laughlin & Co. Limited, lessees, Pittsburgh. Works, Second ave., near Brady st. Steel plates; can roll plates 12 inches thick, 7 feet wide, and 15 tons in weight; annual capacity, 16,500 gross tons. Idle.
- South Connellsville Plant, Humbert Tin Plate Company, Connellsville, Fayette county. General office and works at South Connellsville. Black plates, or sheets, for tinning; annual capacity, 9,000 gross tons.
- Spang (The) Steel and Iron Company, Pittsburgh. Office and works, Etna, Allegheny county. Steel boiler, ship, and tank plates. Idle and for sale.
- Star Tin Plate Company, foot of Twelfth st., Pittsburgh. Black plates, or sheets, for tinning; annual capacity, triple turn, 12,500 gross tons.
- Sunbury Iron Works, Sunbury, Northumberland county. Nail plate.
- Tidewater Works, The Chester Pipe and Tube Company, lessee, 267 South Fourth st., Philadelphia. Works at Chester, Delaware county. Grooved skelp for their own consumption in the manufacture of wrought iron and steel pipe.
- Tyler (The) Tube and Pipe Company, Washington, Washington coun-

- ty. New York office, 26 Cortlandt st. Charcoal skelp iron used by the company in the manufacture of boiler tubes.
- Tyrone Forges, The Tyrone Iron Company, Tyrone, Blair county. Office at Harrisburg. Charcoal boiler-tube skelp; annual capacity, 11,000 gross tons.
- United States Investment Company, 216-17 Ferguson Block, Pittsburgh. Rolling mill for the manufacture of black plates partly erected at Hammondville, Fayette county. Work suspended.
- United States Iron and Tin Plate Works, United States Iron and Tin Plate Manufacturing Company, Demmler, (eighth ward, McKeesport,) Allegheny county. Branch office, 626 Liberty st., Pittsburgh. Specialties in refined and cold-rolled black sheet iron, Bessemer and open-hearth steel sheets, common sheet iron, and tin and terne plates; annual capacity, for black sheets, 18,000 gross tons.
- Valley Iron Works, W. W. Kurtz & Sons, Coatesville, Chester county. Philadelphia office, Bullitt Building. Iron and steel boiler, bridge, ship, and tank plate; annual capacity, 10,000 gross tons. Idle and for sale.
- Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Incorporated, Sharpsburg, Allegheny county. Skelp, bridge, and tank iron and steel.
- Viaduct Iron Works, Coatesville Rolling Mill Company, Coatesville, Chester county. Boiler tube skelp and iron and steel plates and sheets; annual capacity, 15,000 gross tons. *See Brandywine Rolling Mills.*
- Washington Steel and Tin Plate Mills, Griffiths, Scott & Co., Washington, Washington county. Black plates, or sheets, for tinning; annual capacity, 8,400 gross tons.
- Watson town Nail Works, D. C. Kaseman & Co., Watson town, Northumberland county. Iron and steel nail plate.
- Wayne Iron and Steel Works, Brown & Co., Incorporated, Pittsburgh. Works, cor. Tenth st. and Duquesne Way. Crucible steel plates.
- Wellman Steel Works, Thurlow, Delaware county. Steel plates; annual capacity, 20,000 gross tons. Idle and for sale. Address Samuel A. Crozer, Upland, Delaware county, Pa.
- West End Rolling Mill Company and Chain Works, Lebanon, Lebanon county. Skelp, etc.
- West Penn Steel Works, Jennings Steel Company Limited, lessee, Pittsburgh. Office and works on Preble ave., Allegheny. Light gauges of steel sheets and plates for stamping purposes, strips, etc.
- Wheatland Rolling Mill, The South Sharon Steel Company Limited, lessee, Wheatland, Mercer county. Skelp iron, etc.
- Williamsport Iron and Nail Works, Williamsport Iron and Nail Company, Williamsport, Lycoming county. Iron and steel nail plate.
- York Rolling Mill, Steacy and Denney Company, York, York county. Plate and skelp iron; annual capacity, 10,000 gross tons.

DELAWARE—6.

- Edge Moor Iron Company, Edge Moor, New Castle county. Philadelphia office, 1600 Hamilton st. Sheared and universal plates up to 104 inches in width; annual capacity, 25,000 gross tons.
- Marshallton Iron and Steel Company Incorporated, Marshallton, New Castle county. Sheet iron; annual capacity, 4,000 gross tons.
- Minquas Iron Works, McCullough Iron Company, Equitable Building, Wilmington, New Castle county. Fine sheet steel and "Harvey's patent cleaned" sheet iron; also galvanized sheet iron and steel; annual capacity, 6,000 gross tons.
- Newport Rolling Mills, Marshall Iron Company, Newport, New Castle county. Black sheet iron and sheet steel, Nos. 18 to 28; annual capacity, 2,200 gross tons.
- Riverside Iron Works, Delaware Iron Company, New Castle, New Castle county. Philadelphia office, 222-24 South Third st. Charcoal boiler plate, tank, and flue iron, and sheared skelp iron; annual capacity, 6,000 gross tons. For lease.
- Wilmington Rolling Mills, The Seidel and Hastings Company, Wilmington. Charcoal iron boiler plates and plate iron generally; annual capacity, single turn, 5,000 gross tons of plate iron.

MARYLAND—4.

- Baltimore (The) Tinplate Company, Locust Point, Baltimore. Black plates, or sheets, for tinning; annual capacity, 7,000 gross tons.
- Cumberland Rolling Mill, Baltimore and Ohio Railroad Company, Cumberland, Allegany county. Main office, Mount Clare, Baltimore. Flange and refined plate iron. Idle and for lease.
- Cumberland Steel and Tin Plate Company, Cumberland, Allegany county. Pickled and cold-rolled black sheets for tinning; annual capacity, 7,500 gross tons of black plates.
- Stickney (The) Iron Company, Baltimore. Office and works at Canton, a suburb of Baltimore, Baltimore county. Black plates, or sheets, for tinning; annual capacity, 3,300 gross tons.

VIRGINIA—1.

- Old Dominion Iron and Nail Works Company, Richmond, Henrico county. Works on Belle Isle, in the city of Richmond. Nail plate.

WEST VIRGINIA—5.

- Crescent Iron Works, Whitaker Iron Company, Wheeling, Ohio county. Iron and steel sheets, black plates for tinning, and galvanized sheets; annual capacity, 20,000 gross tons.
- La Belle Iron Works, Wheeling, Ohio county. Steel nail and tack plate, skelp, and black plates, or sheets, for tinning; annual capacity, 20,000 gross tons of black plates, or sheets.

Riverside Iron Works, Wheeling. Works at Wheeling, Ohio county, and at Benwood, Marshall county. Steel strips and plates, tack plate, skelp steel, etc.

Wheeling Steel and Iron Company, Wheeling. Two works: Benwood Works, at Benwood, Marshall county; skelp iron. Top Mill, at Wheeling, Ohio county; iron and steel sheets; annual capacity, 3,600 gross tons of sheets.

KENTUCKY—6.

American Nut and Bolt Company, Newport, Campbell county. Stove-pipe iron.

Ewald Iron Company, 941 North Second street, St. Louis. Works at Louisville, Jefferson county. Plate and sheet iron, and tank, shell, and flange steel plates.

Licking Iron Works, Licking Rolling Mill Company, Covington, Kenton county. Bridge, boiler, and sheet iron; also black plates for tinning for their own use. Specialty, boiler plate.

Mitchell, Tranter & Co., Second and Elm sts., Cincinnati. Works at Covington, Kenton county. Plate and sheet iron and boiler plate and plow steel, etc.

Newport Rolling Mill Company, Newport, Campbell county. Steel sheets for roofing, corrugating, and galvanizing purposes; annual capacity, triple turn, 15,000 gross tons.

Norton Iron Works, Ashland, Boyd county. Steel nail plate.

TENNESSEE—1.

Knoxville Iron Company, Knoxville, Knox county. Nail plate.

ALABAMA—3.

Alabama Iron and Steel Company, A. J. Perry, Receiver, Brierfield, Bibb county. Iron nail plate.

Bessemer (The) Rolling Mills, Bessemer, Jefferson county. Iron plates and sheets. Owned by Morris Adler, of Birmingham, and others. Idle since the spring of 1891 and for sale.

Birmingham Rolling Mills, Birmingham Rolling Mill Company, Birmingham, Jefferson county. Iron and open-hearth steel plates and sheets.

OHIO—36 COMPLETED AND 1 PROJECTED.

Ætna-Standard Iron and Steel Company, Bridgeport, Belmont county. Five works, three of which make plates and sheets. Ætna Works, at Bridgeport; steel sheets, plates, bands, etc. Standard Sheet Mill Works, at Bridgeport; black plates, steel sheets, galvanized iron, corrugated iron, and other forms of roofing iron; annual capacity, 14,000 gross tons. Standard Black Plate Mills, at Bridgeport; black plates, or sheets, for tinning; annual capacity, 7,200 gross tons.

- Beaver (The) Tin Plate Company, Lisbon, Columbiana county. Black plates for tinning and light sheets of No. 38 gauge and under; annual capacity, 10,000 gross tons.
- Belfont Iron Works, Belfont Iron Works Company, Ironton, Lawrence county. Iron and steel and combined iron and steel nail plate.
- Bellaire Steel Company, Bellaire. Skelp steel, bridge plates, etc.
- Britton (The) Rolling Mill Company, 66 Hoyt ave., Cleveland, Cuyahoga county. Soft steel sheets and black plates for tinning; annual capacity, triple turn, 6,000 gross tons.
- Brown Bonnell (The) Iron Company, Youngstown, Mahoning county. Universal mill plates and other plates and sheets.
- Burgess Steel and Iron Works, Portsmouth, Scioto county. Iron and steel boiler plates.
- Cambridge (The) Iron and Steel Company, Cambridge, Guernsey county. Iron and steel sheets; annual capacity, 18,000 gross tons.
- Canton Rolling Mill Company, Canton, Stark county. Iron and steel black sheets for stamping, galvanizing, and roofing; annual capacity, triple turn, 5,000 gross tons.
- Cincinnati Rolling Mill and Tin Plate Company, 298 East Pearl street, Cincinnati. Works at Riverside, Hamilton county. Black plates, or sheets, for tinning; annual capacity, triple turn, 7,200 gross tons.
- Cleveland (The) Steel Company, Cleveland, Cuyahoga county. Light steel plates and sheets; annual capacity, 30,000 gross tons.
- Coleman (The) Shields Company, Niles, Trumbull county. Pipe casing and tube iron; annual capacity, 11,000 gross tons.
- Crescent (The) Sheet and Tin Plate Company, Cleveland, Cuyahoga county. Black plates, or sheets, for tinning and stamping; annual capacity, 13,000 gross tons.
- Dennison (The) Rolling Mill Company, Dennison, Tuscarawas county. Common cold-rolled sheets for stamping and black plates, or sheets, for tinning; annual capacity, 5,000 gross tons. Tack plate a specialty.
- Eagle (The) Crucible Steel Company, Canton. Wire drawing plates.
- Falcon Iron and Nail Company, Niles, Trumbull county. Two mills at Niles: Falcon Iron and Nail Works and Russia Sheet Iron Mills. Iron and steel skelp, sheet iron, sheet steel, and galvanized sheets; annual capacity, 27,000 gross tons of skelp and 16,500 tons of sheet iron, sheet steel, and galvanized sheets.
- Falcon Tin Plate and Sheet Company, Niles, Trumbull county. Black plates, or sheets, for tinning; annual capacity, 13,000 gross tons.
- Haselton Iron Works, The Andrews Brothers Company, Youngstown, Mahoning county. Plate, sheet, skelp, and band iron and steel.
- Irondale Rolling Mill, Wallace, Banfield & Co., Irondale, Jefferson county. Branch office, 246 Third ave., Pittsburgh. Black plates, or sheets, for tinning; annual capacity, triple turn, 8,000 gross tons.

- Ironton Rolling Mill, The Eagle Iron and Steel Company, Ironton, Lawrence county. Iron and steel sheets.
- Jefferson Iron Works, S. K. Wallace, Receiver, Steubenville, Jefferson county. Skelp iron and steel.
- Kelly Nail Works, Kelly Nail and Iron Company, Ironton, Lawrence county. Iron and steel nail plate.
- Laughlin Nail Company, Wheeling, W. Va. Works at Martin's Ferry, Belmont county, Ohio. Black plates, or sheets, for tinning; annual capacity, 28,000 gross tons.
- Mahoning Valley Works, The Mahoning Valley Iron Company, Youngstown, Mahoning county. Tank and plate iron.
- Morton (The) Tin Plate Company, Cambridge, Guernsey county. Fine sheet steel for tinning; annual capacity, 6,000 gross tons.
- Newark Weldless Tube and Steel Company, Newark, Licking county. Does not make plates or sheets but may add a sheet mill.
- New Philadelphia (The) Iron and Steel Company, New Philadelphia, Tuscarawas county. Common and refined sheet iron and sheet steel; annual capacity, 15,000 gross tons.
- Otis (The) Steel Company Limited, Cleveland, Cuyahoga county. Steel plates.
- Piqua (The) Rolling Mill Company, Piqua, Miami county. Iron and steel sheets; annual capacity, 8,000 gross tons.
- Reeves (The) Iron Company, Canal Dover, Tuscarawas county. Black, galvanized, and cold-rolled sheet iron and sheet steel; also black plates, or sheets, for tinning.
- Struthers (The) Iron and Steel Company, Struthers, Mahoning county. All sizes of iron and steel sheets; annual capacity, 6,500 gross tons. (Formerly called the Summers Iron Works.)
- Toledo (The) Rolling Mill Company, Toledo, Lucas county. Works at East Toledo. Iron and steel sheets.
- Union (The) Iron and Steel Company, Youngstown, Mahoning county. (Successor to the Youngstown Iron and Steel Company and Cartwright, McCurdy & Co.) Warren Mill, at Warren, Trumbull county; skelp iron, etc.
- Wellsville Plate and Sheet Iron Company, Wellsville, Columbiana county. Plate and sheet iron and steel and black plates for tinning; annual capacity, 10,000 gross tons.

INDIANA—12.

- American (The) Tin Plate Company, Elwood, Madison county. Two works: Elwood Works, at Elwood; black plates for tin and terne plates, all consumed by the company in its tinplate works; annual capacity, triple turn, 65,000 gross tons. Montpelier Works, at Montpelier, Blackford county; black plates, or sheets, for tinning; annual capacity, triple turn, 13,000 tons.

Atlanta (The) Steel and Tin Plate Company, (successor to The Indiana Tinsplate Manufacturing Company,) Atlanta, Hamilton county. Black plates for tinning and light gauge sheets up to No. 34 gauge and in sizes up to 30 x 96 inches; annual capacity, 13,500 gross tons of plates and sheets.

Corning Steel Company, Hammond, Lake county. Steel sheets; annual capacity, 12,000 gross tons. For sale.

Gas City Tinsplate Works, The Morewood Company, Gas City, Grant county. Black plates for tin and terne plates; annual capacity, 17,000 gross tons.

Irondale (The) Steel and Iron Company, Richmond. Works at Middletown, Henry county. Black plates, or sheets, for tinning; annual capacity, 10,000 gross tons.

Lakeside Nail Company, First National Bank Building, Chicago. Works at Hammond, Lake county. Nail plate.

Midland Steel Company, Muncie, Delaware county. Black plates, or sheets, for tinning; also stamping sheets; annual capacity, 12,000 gross tons of sheets and plates.

National (The) Tin Plate Company, Anderson, Madison county. Black plates, or sheets, for tinning; annual capacity, triple turn, 13,000 gross tons.

Union Steel Company, 415 Locust st., St. Louis, Mo. Works at Alexandria, Madison county. Iron and steel sheets, etc.

Wright Shovel Company, Anderson, Madison county. Two works: Anderson Works, at Anderson; sheets for shovels, spades, and scoops; annual capacity, 1,800 gross tons. Greenfield Works, at Greenfield, Hancock county; shovel plate; annual capacity, 1,800 gross tons.

ILLINOIS—9.

Calumet Works, Calumet Iron and Steel Company, Rookery Building, Chicago. Works at South Chicago, Cook county. Iron and steel nail plate. I. T. Hartz, Receiver, Rookery Building, Chicago. Idle for several years.

Granite City Steel Company, corner Cass avenue and Second street, St. Louis, Missouri. Works at Granite City, Madison county, Illinois. Plates and sheets, etc.

Hartmann, Hay & Reis, Belleville, St. Clair county. Nail plate.

Illinois Steel Company, Rookery Building, Chicago. New York office, 46 Wall st. Four plants in Illinois, only one of which makes plates. South Works, located at South Chicago. Steel boiler, ship, and tank plate, etc.; annual capacity, 70,000 gross tons of plates.

Joliet Sheet Mill, Great Western Tin Plate Company, Northern Office Building, Chicago. Works at Joliet, Will county. Black plates, or sheets, for tinning; annual capacity, triple turn, 7,000 gross tons.

Norton Brothers, 813 Masonic Temple, Chicago. Works at Maywood,

Cook county. Experimenting with fluid-metal rolling machinery for the production of steel sheets for tinning.

Springfield Iron Company's Iron and Steel Works, The Springfield Iron Company, Springfield. Chicago office, Old Colony Building; St. Louis office, Union Trust Building. Steel plates and sheets of all sizes; annual capacity, 18,000 gross tons.

Valley Steel Company, Belleville, St. Clair county. Office, American Central Building, St. Louis, Missouri. Steel nail plate and large flats.

Western Tube Company, (formerly Haxtun Steam Heater Company,) Kewanee, Henry county. Skelp iron and steel used by the company in the manufacture of pipe; annual capacity, 40,000 gross tons.

WISCONSIN—1.

West Superior Iron and Steel Works, Wisconsin Steel Company, West Superior, Douglas county. Bessemer steel plates, etc.

MISSOURI—2.

Granite Iron Rolling Mills, St. Louis Stamping Company, Cass ave. and Second st., St. Louis. Works at Second and Destrehan sts. Stamping sheet iron for "granite iron ware," galvanizing sheets, and black plates, or sheets, for tin and terne plates; annual capacity, 14,000 gross tons.

St. Joseph Bar and Axle Company, St. Joseph, Buchanan county. Steel nail plate.

COLORADO—1.

Colorado (The) Fuel and Iron Company, Pueblo. Principal office, Boston Building, Denver. Works at Bessemer, near Pueblo, Pueblo county. Tank plate; annual capacity, 30,000 gross tons.

CALIFORNIA—3.

Judson Manufacturing Company, Oakland, Alameda county. Office and salesroom, cor. Howard and Beale sts., San Francisco. Tack plate, nail plate, etc.

Los Angeles Iron and Steel Works, R. H. Herron, Los Angeles, Los Angeles county. Iron and steel sheets and light plates; annual capacity, 7,000 gross tons.

Pacific Iron and Nail Company, 132 Market st., San Francisco. Cable address, "Nails." Works at Oakland, Alameda county. Iron nail plate; also steel nail plate from imported slabs.

UNITED STATES.

Total number of iron and steel plate, sheet, and skelp mills in the United States in April, 1898: 230 completed, 2 building, 1 partly erected, and 1 projected.

TINPLATE WORKS.

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In this list the word "tinplates" is limited to pure tin-coated sheets. Sheets coated with a mixture of tin and lead are referred to as "terne" plates. The weekly capacity of the works is given as reported by the manufacturers, and, unless otherwise stated, is given on single turn in boxes of 112 plates, 14 inches by 20 inches, I. C., full weight of 108 pounds. The word "set" refers to the set of tinning pots or the "machine" necessary for tinning or coating the black plates. "Black plates" are the iron or steel sheets before they are coated. The rolling mill or black plate department of tinplate works which make their own black plates is fully described in the list of rolling mills and steel works beginning on page 73; also in a special list of plate, sheet, and skelp mills beginning on page 228.

NEW YORK.

Iron Clad Manufacturing Company, 22-24 Cliff st., New York City.

Works at Brooklyn, Kings county. Tinning plant erected about 1876 and since greatly enlarged; product chiefly used in its own works in the manufacture of stamped ware. Fuel, coal. Buys black plates. Robert Seaman, President and Treasurer; W. B. Richards, Vice-President; David D. Otis, Secretary; John S. Clark, Superintendent.

Meurer Brothers Company, 571-77 Flushing ave., Brooklyn, Kings county. Built in 1894; first tin and terne plates made in March, 1894; 8 sets, 2 for tinplates and 6 for terne plates; weekly capacity, 500 boxes of tinplates and 2,100 boxes of terne plates. Fuel, coal. Brands: for tinplates, "Florida" and "Howard" for charcoal and "Albert" and "Brooklyn" for coke; for terne plates, "Excelsior," "Flushing," "Grace," "Meurer's Genuine Tinned Iron Sheets," "Meurer's Old Method," "Meurer's Roofing," "Pullman," "Liberty," and "Superior." Buys black plates.

Somerton Tin Plate Works, Somers Brothers, Third st. and Third ave., Brooklyn, Kings county. Built in 1891 and first tinplates made in October, 1892; 4 sets; product, tinplates; weekly capacity, 1,800 boxes. Fuel, coal. Brands, "Somerton" for best stamping and "Somerbrook" for bright charcoal. Make black plates. *See Rolling Mills in New York.*

Number of tinplate works in New York: 3.

PENNSYLVANIA.

Aliquippa Tin Plate Works, Aliquippa, Beaver county. Built in 1892; first tin and terne plates made in August, 1892; 3 sets, 1 for tinplates and 2 for terne plates; weekly capacity, double turn, 172 boxes of tinplates and 344 boxes of terne plates. Fuel, natural gas. Buy black plates. (Formerly operated by the Aliquippa Tin Plate Company.) Idle and for sale.

American Tin and Terne Plate Company, 22-24 Otter st., Philadelphia. Built in 1891-2 and first tin and terne plates made in 1892; 10 sets, 3 for tinplates and 7 for terne plates; weekly capacity, 720 boxes of tinplates and 1,680 boxes of terne plates. Fuel, bituminous coal. Brands: for tinplates, "Peerless," "Arlington," and "Channing" for charcoal and "Imperial" and "Franklin" for coke; for old style terne plates, "American M. S.," "Keystone Hand-dipped," and "Black Diamond;" for charcoal terne plates, "Keystone," (extra-coated,) "Quaker City," "Puritan," palm oil finish, and "I. D. B.," palm oil finish; for coke terne plates, "Horse-Shoe," palm oil finish, "Arrow," and "Hancock." Buys black plates. J. E. Straus, President; M. F. Straus, Vice-President and Manager.

Apollo Sheet Iron Mills, P. H. Laufman & Co. Limited, Apollo, Armstrong county. Works in Westmoreland county. Pittsburgh office, Germania Bank Building. Tinning plant added to rolling mill in 1891; first terne plates made in May, 1891; one set; product, terne plates; weekly capacity, 30 tons of 30 x 96-inch plates. Fuel, natural gas. Brand, Laufman's "Apollo." Make black plates for their own use. *See Rolling Mills in Western Pennsylvania for a list of officers, (P. H. Laufman & Co. Limited.)*

Blairsville Rolling Mill and Tin Plate Company, Blairsville, Indiana county. Built in 1892 and first tin and terne plates made in November, 1892; 6 sets, 5 for tinplates and 1 for terne plates; weekly capacity, double turn, 1,200 boxes of tinplates and 300 boxes of terne plates. Fuel, coal. Brands: for tinplates, "P. S. & Co.," "Pansy," and "Juno" for charcoal and "Apex" for coke; for terne plates, "Bala," "Kelso," "Merion," "Old Style Oil Finish," "Orient Crown," "Orion," "Potts A. L. T. Old Style," "Rutter," "Zenith," "Devon," and "Potts Old Process." Makes black plates. *See Rolling Mills in Western Pennsylvania for a list of officers and selling agents.*

Cadwallader, (C. W.,) Pittsburgh. Works in the Twenty-third ward. Built in 1891 and burned and rebuilt in 1894; first terne plates made December 27, 1891; 4 sets, 1 for tinplates and 3 for terne plates; weekly capacity, 200 boxes of tinplates and 500 boxes of terne plates. Fuel, natural gas. Brands: for tinplates, "Primrose" and "Petunia" for charcoal; for terne plates, "Optimus" and "NF." Black plates obtained from Hamilton & Co.

Canonsburg Iron and Steel Company, Canonsburg, Washington county. Branch office, Germania Bank Building, Pittsburgh. Tinning plant added to rolling mill in 1894; first tin and terne plates made April 1, 1894; 4 sets, 2 for tinplates and 2 for terne plates; weekly capacity, 240 boxes of tinplates and 240 boxes of terne plates, 20 x 28. Fuel, natural gas. Brands: for tinplates, "Band Coke," "Ensign," "Pennant," "Canonsburg A," "Canonsburg AA," and "Canonsburg AAA;" for terne plates, "Gold Standard Redipped," "Legal Tender Old Process," "Coin Old Method," "ML Old Style," "Medal Old Style," "Orient," "Aurora," and "Dawn." Makes black plates. Selling agents, the Steel Box Band Company Limited, 143-45 Varick st., New York City. *See Rolling Mills in Western Pennsylvania for a list of officers.*

Ellwood Tin Plate Works, Ellwood Tin Plate Company, general office, Perry-Payne Building, Cleveland, Ohio. Works at Ellwood City, Lawrence county. Tinning plant added to rolling mill in 1894 and first tin and terne plates made in January, 1895; 16 sets for tin and terne plates; weekly capacity, 4,000 boxes of tin and terne plates. Fuel, coal. Brands: for tinplates, "Silverine," "Saturn," "Anti-Rust," and "P. O. P." for charcoal, and "American" and "American Palm" for coke; for terne plates, "Monogram," "N. C. T.," "Charter Oak," "Banner," "Weather Proof," and "MF." Trade-mark, a red star. Make black plates. Sales made by the company. *See Rolling Mills in Western Pennsylvania for a list of officers.*

Ferguson Tin Plate Company, East Liberty, Pittsburgh, Allegheny county. Built in 1895; first terne plates made in July, 1895, and first tinplates in September, 1895; 3 sets for terne plates; weekly capacity, 500 boxes of 20 x 28 terne plates. Fuel, natural gas and coal. Brands, Ferguson's "Redipped," "Extra Coated," "Old Style," "Lima Redipped," "Magnet," "Volcano," and "Red Cross." Buys black plates. Works owned by A. C. Ferguson and F. H. Speer.

Follansbee Brothers Company, (formerly James B. Scott & Co.,) 328-32 Second ave., Pittsburgh. Works in Allegheny City. Built in 1891-2; first tin and terne plates made in January, 1892; 5 sets; product, tin and terne plates. Fuel, coal. Brands: for tinplates, "Finest" and "Clifton" for charcoal and "Furnace" for coke; for terne plates, "Scott's Extra Coated," "Triumph Old Method," "Protection Old Process," "Orbit Redipped," "Old Reliable Redipped," "Duquesne," "Neville Old Style," "Oakmont," "Sherwood," "Pittsburgh," "Raymond," "Allegheny," "Braddock Old Style," "Kenton," "Thurso," and "Lionel." Buys black plates. B. G. Follansbee, President; William U. Follansbee, Secretary and Treasurer.

Hamilton, (John,) near Tecumseh st., (twenty-third ward,) Pittsburgh. Built in 1890 and first terne plates made in April, 1890; 3 sets; product, tin and terne plates; weekly capacity, 450 boxes, 20 x 28. Fuel,

natural gas. Brands: for tinplates, "Ivy" and "Pansy" for charcoal and "Pink" for coke; for terne plates, "Hamilton's Best Redipped," "Osceola Old Style," "Bonus," "Fort Pitt," "G. A. R.," "Hamilton's Excelsior Hand Coated," "Hazlewood," "Killbuck," "Lulu," "Mingo" old process, and "Hamilton's Best Charcoal Iron Redipped." Black plates obtained from Hamilton & Co.

Johnstown Tinplate Works, Johnstown Tinplate Company, 69 Wall st., New York. Works at Johnstown, Cambria county. Built in 1898 and put in operation in May, 1898; 2 sets, one for tinplates and one for terne plates; weekly capacity, 750 boxes of tinplates and 750 boxes of terne plates. Fuel, bituminous coal. Make black plates. *See Rolling Mills in Western Pennsylvania for a list of officers.*

Lalanc and Grosjean Manufacturing Company, Harrisburg, Dauphin county. Main office, 19 Cliff st., New York; branch offices, Boston and Chicago. Tinning plant added to rolling mill in 1895; first tin and terne plates made in July, 1895; 7 sets; 5 for tinplates and 2 for terne plates; weekly capacity, 1,750 boxes of tinplates and 750 boxes of terne plates. Fuel, coal. Brands: for tinplates, "L. & G. Mfg. Co. AA1," "L. & G. Mfg. Co. AA2," "L. & G. Mfg. Co. AA3," and "L. & G. Mfg. Co. AA5" for charcoal, and "L. & G. Mfg. Co. AA4," "L. & G. Mfg. Co. AA6," and "L. & G. Mfg. Co. AA7" for coke; for terne plates, "L. & G. Mfg. Co. A1," "L. & G. Mfg. Co. A2," and "L. & G. Mfg. Co. A3." Makes black plates. *See Rolling Mills in Central Pennsylvania for a list of officers.*

Laufman (The) Tin Plate Company, 421 Wood st., Pittsburgh. Works at Butler Junction, W. P. R. R., Allegheny county. Tinning plant built in 1890 and first terne plates made in June, 1890; 4 sets; product, terne plates; weekly capacity, 500 boxes of 240 lbs. each, 20 x 28 plates, "old process." Fuel, natural gas. Brands, Laufman's "Apollo," "Freeport," "Tip Top," and "Allegheny." Black plates obtained from the Apollo Sheet Iron Mills. P. H. Laufman, Proprietor; W. D. Comporet, Manager. Selling agents, Neal Brothers, Pittsburgh; H. R. DeMilt & Co., New York City.

Merchant & Co., (incorporated,) 517 Arch st., Philadelphia. Branch offices, 247 Water st., New York; 584 Flushing ave., Brooklyn; 36 Lasalle st., Chicago. Works on Washington ave. above Twentieth st. Eight sets; product, tin and terne plates. Fuel, coal. Brands: for tin plates, "Florence," "Minerva," "Palma," "Pisa," "Spa," "Rose," "Edgeware," and "Violet" for charcoal, and "Leslie" and "Rose" for coke; for terne plates, "Alaska," "American Old Style," "Arch," "Camaret," "Elsie," "Emlyn," "Empire," "Hand Coated," "Hickory," "Kismet," "Merchant's Old Method," "Merchant's Roofing," "Palm," "Special Extra Coated," and "Stanley." Buy black plates. Clarke Merchant, President; Henry W. Merchant, Secretary and Treasurer. Monongahela Tin Plate Company, Thirteenth st. and P. & L. E. R. R.,

South Side, Pittsburgh. Built in 1893; first terne plates made June 1 and first tinplates November 15, 1893; 12 sets; product, tin and terne plates; weekly capacity, 7,500 boxes of 14 x 20 plates, either 135 lbs., 108 lbs., or 100 lbs. to the box. Fuel, natural gas. Brands: for coke tinplates, "Monon" and "Oliver (O. H.);" for terne plates, "Iron City," "Soho," "Manchester," and "Sheffield." Makes black plates. *See Rolling Mills in Allegheny County, Pennsylvania, for a list of officers.*

National Tin Plate Company of Pennsylvania, Monessen, Westmoreland county. Built in 1897-8; first tin and terne plates made in March, 1898; 20 sets, 16 for tinplates and 4 for terne plates; weekly capacity, 10,000 boxes of tin and terne plates. Fuel, coal. Makes black plates. *See Rolling Mills in Western Pennsylvania for a list of officers.*

New Castle Steel and Tin Plate Company, (incorporated,) New Castle, Lawrence county. Built in 1892-3; first tin and terne plates made in November, 1893; 32 sets; weekly capacity, double turn, 16,000 boxes of tin and terne plates. Fuel, coal. Brands: for tinplates, "New Castle 'Palm' Coke" and "New Castle Coke" for coke plates; "New Castle Best Palm," "New Castle Palm," "New Castle Charcoal," and "Shenango" for charcoal plates; for terne plates, "New Castle Old Method," "Shenango," and "Juniata." Makes black plates. Selling agents, Phelps, Dodge & Co., New York. *See Rolling Mills in Western Pennsylvania for a list of officers.*

Nivin and Hassard (The) Tin Plate Company Limited, 1313-15 Washington ave., Philadelphia. Built in 1895 and first tin and terne plates made in June, 1895; 3 sets, one for tinplates and 2 for terne plates; weekly capacity, 200 boxes of 14 x 20 tinplates and 300 boxes of 20 x 28 terne plates. Fuel, bituminous coal. Brands: for tinplates, "Jewel," "Rambler," and "H. P." for charcoal; for terne plates, "Nivin & Hassard New Method," "N. & H. Roofing," "Old Method," "Sensation," and "Echo." Buys black plates. E. F. Nivin, Chairman; S. D. Hassard, Secretary and Treasurer.

Norristown Tin Plate Company, Norristown, Montgomery county. Works at Earnest Station. Built in 1892 and first tin and terne plates made in June, 1892; 7 sets; weekly capacity, double turn, 1,000 boxes of terne plates. Fuel, coal. Brands for terne plates, "Norristown New Method," "B. D. & F.," "Norristown Old Style," "Norristown Extra," and "Norristown." Buys black plates. Richard Lewis, General Manager. Selling agents, C. S. Trench & Co., 83 Fulton st., New York.

Pennsylvania Tin Plate Company, New Kensington, Westmoreland county. New York office, Temple court. Built in 1895 and first tin and terne plates made in April, 1895; 10 sets; weekly capacity, double turn, 5,000 boxes of tinplates. Fuel, coal. Brands: for tin-

plates, "Melvin" and "Range" for charcoal and "B. G." and "Pecanic" for coke; for terne plates, "Defender." Makes black plates. *See Rolling Mills in Western Pennsylvania for a list of officers and selling agents.*

Penn Treaty Iron Works, Marshall Brothers & Co., Beach and Marlborough sts., Philadelphia. Tinning plant added to rolling mill in 1891; first terne plates made in January and first tinplates in April, 1891; 6 sets, 4 for tinplates and 2 for terne plates; weekly capacity, 4,000 boxes of tinplates and 500 boxes of terne plates. Fuel, bituminous coal. Brands: for tinplates, "Penn Treaty" for charcoal and coke; for terne plates, "Penn Treaty," "Girard," and "Marshall." Make black plates. *See Rolling Mills in Pennsylvania, (Philadelphia and vicinity.)*

Philadelphia Iron and Tin Plate Works, Hughes & Patterson, Incorporated, Philadelphia. Works, Beach and Vienna sts. Tinning plant added to rolling mill in 1893; first tinplates made in September and first terne plates in December, 1893; 6 sets, 3 for tinplates and 3 for terne plates; weekly capacity, 1,650 boxes of tinplates and 650 boxes of terne plates. Fuel, bituminous coal. Brands: for tinplates, "H. & P. Best Bright," "Seminole Bright," "Mohawk Bright," and "Cherokee Bright;" for terne plates, "H. & P. Redipped Roofing," "H. & P. Best Roofing," "Delaware Roofing," "Huron Roofing," and "Oneida Roofing." Buy black plates. Idle. *See Rolling Mills in Pennsylvania (Hughes & Patterson, Philadelphia and vicinity) for a list of officers.*

Philadelphia (The) Tin Plate Company, Nathan Trotter & Co., proprietors, 36 North Front st., Philadelphia. Works at Eighteenth st. and Washington ave. Built in 1893 and first tin and terne plates made January 1, 1894; 3 sets; weekly capacity, 750 boxes of terne plates. Fuel, bituminous coal. Brands: "Trotter's New Method," "Trotter's Roofing," "Elziver," "Sharon," "Enid," "Verona," "Trotter's Special," and "Triumph." Buys black plates. Idle; may be abandoned.

Phillips Tin Plate Works, Phillips Tin Plate Company Incorporated, 925 Chestnut st., Philadelphia. Works at Tenth st. and Susquehanna ave. Built in 1892; first terne plates made in October and first tinplates in November, 1892; 5 sets, 2 for tinplates and 3 for terne plates; weekly capacity, 500 boxes of tinplates and 750 boxes of terne plates. Fuel, coal. Brands: for tinplates, "Century" and "Oak" for charcoal, and "Walnut" and "Gladys" for coke; for terne plates, "F. R. P. Extra," "Phillips' Roofing," "Boston," "Boston Old Method," "National," "Columbus," "Republic," and "Zero." Buy black plates. Frederick McOwen, President; W. Vernon Phillips, Secretary; Harold L. Cheney, Treasurer; F. R. Phillips, Manager. Sales made by the company.

Pittsburgh Tin Plate Works, New Kensington, Westmoreland county.

Built in 1891-2; first terne plates made in February and first tinplates in October, 1892; 12 sets, 10 for tinplates and 2 for terne plates; weekly capacity, double turn, 5,000 boxes of tinplates and 600 boxes of terne plates. Fuel, bituminous coal. Brands: for tinplates, "Opal" and "Onyx" for charcoal, and "Alba," "Alba Extra," and "Lorna" for coke; for terne plates, "Kensington," "Amber," and "P. T. W. Old Fashion." Make black plates. *See Rolling Mills in Western Pennsylvania for a list of officers and selling agents.*

Reading Tin Plate Company, Reading, Berks county. Built in 1895; first terne plates made in March, 1895; 2 sets; product, terne plates; weekly capacity, 270 boxes of 20 x 28 plates. Fuel, bituminous coal. Brands, "America," "Reading Roofing," "Horton," "L. C.," "Mt. Penn," "Spring," "C. H.," "H. M.," and "Reading Old Style." Buys black plates. Howard L. McIlvain, President; Lewis Crater, Secretary and Treasurer; Charles A. High, Manager.

Shenango Valley Tinplate Works, Shenango Valley Steel Company, New Castle, Lawrence county. Building a tinning plant to contain 40 tinning sets; product, tin and terne plates; estimated weekly capacity, 27,000 boxes. Fuel, coal. Will make black plates. *See Shenango Valley Steel Company in Western Pennsylvania for a list of officers. See Furnaces in the Shenango Valley, Pennsylvania.*

South Connellsville Plant, Humbert Tin Plate Company, Connellsville, Fayette county. General office and works at South Connellsville. Built in 1896; first tinplates made December 4, 1896; 7 sets; product, tinplates; weekly capacity, 3,600 boxes of tinplates. Fuel, natural gas. Brand, "Humbert." Makes black plates. Selling agents, Dickerson, Van Dusen & Co., 29 Cliff st., New York. *See Rolling Mills in Western Pennsylvania (South Connellsville Plant) for a list of officers.*

Star Tin Plate Company, foot of Twelfth st., Pittsburgh. Built in 1895; 12 sets, 10 for tinplates and 2 for terne plates; weekly capacity, double turn, 5,200 boxes of tinplates and 800 boxes of terne plates. Fuel, natural gas. Brand, "Star" coke tinplates. Makes black plates. *See Rolling Mills in Allegheny County, Pennsylvania, for a list of officers.*

Taylor (N. and G.) Company's Tinplate Works, N. and G. Taylor Company, 301-305 Branch st., Philadelphia. Works on Tasker st., from Meadow st. to Swanson st. Built in 1891; first terne plates made in April and first tinplates in November, 1891; 22 sets; weekly capacity, double turn, 20,000 boxes of either tin or terne plates. Fuel, coal. Brands: for tinplates, "Hand-Dipped," "Brilliant," "Royal," "Merion," and "Linden" for charcoal, and "Almond," "Locust," and "Mint" for coke; for terne plates, Genuine "Taylor Old Style," "The Taylor Roofing Tin," "Old Method," "Columbia," "Maple," "Willow," "Knoxall," "Spruce," and "Globe." Buy black plates.

United States Iron and Tin Plate Works, United States Iron and Tin Plate Manufacturing Company, Demmler, Allegheny county. Original works erected in 1874; first terne plates made in 1874 and first tinplates in 1876; manufacture stopped in 1878 and resumed in 1890; new tin house built on modern plan in 1898; 12 sets, 8 for tinplates and 4 for terne plates; weekly capacity, double turn, 4,000 boxes of tinplates and 2,500 boxes of terne plates. Fuel, natural gas. Brands: for tinplates, "U. S. bright," "Youghiogeny bright," and "Versailles bright" for charcoal and "Mifflin" for coke; for terne plates, "U. S. Monongahela," "U. S. Eagle," "U. S. Redipped," "U. S. Grant," and "Demmler Redipped." Make black plates. *See Rolling Mills in Allegheny County, Pennsylvania, for a list of officers and selling agents.*

Washington Steel and Tin Plate Mills, Griffiths, Scott & Co., Washington, Washington county. Built in 1896; first tin and terne plates made in July, 1896; 9 sets; weekly capacity, 1,800 boxes of tinplates and 1,800 boxes of terne plates. Fuel, natural gas. Brands, for tinplates, "Washington" for charcoal and coke; for terne plates, "Washington" and "Washington Old Style." Make black plates. *See Rolling Mills in Western Pennsylvania for a list of officers.*

PROJECTED.

Neshannock Sheet and Tin Plate Company, New Castle, Lawrence county. Contemplates adding a tinning plant to its rolling mill. Makes black plates. *See Rolling Mills in Western Pennsylvania for a list of officers.*

PURE LEAD-COATED SHEETS.

Ajax (The) Lead Coating Company, 46-52 Richmond st., Philadelphia. Plant erected in 1889 for coating iron or steel sheets with pure lead; product, flat or corrugated lead-coated sheets up to 30 inches by 12 feet in size; weekly capacity, 20 to 25 tons. Fuel, bituminous coal. Brand, "Ajax." Buys iron or steel sheets. J. G. Hendrickson, President; F. J. Clamer, Vice-President; J. R. Neison, Secretary and Treasurer.

Number of tinplate works in Pennsylvania: 31 completed, 1 building, and 1 projected. In addition 1 works make pure lead-coated sheets.

MARYLAND.

Baltimore (The) Tinplate Company, Locust Point, Baltimore. Built in 1891-2; first tinplates made May 11, 1892; 4 sets, 3 for tinplates and one for terne plates; weekly capacity, double turn, 1,750 boxes of tinplates and 550 boxes of terne plates. Fuel, coal. Brand, "Baltimore" for tin and terne plates. Makes black plates. (Formerly operated by The Baltimore Iron, Steel, and Tinplate Company.) *See Rolling Mills in Maryland for a list of officers.*

Matthai, Ingram & Co., 120 Hanover st., Baltimore. Works, Ohio avenue and Light, Winder, and Byrd sts. New York office, 77-79 Beekman st. Built in 1892 and first tinplates made in April, 1892; 2 sets; weekly capacity, 372 boxes of tinplates, all consumed in the works. Fuel, coal. Buy black plates. May add new tinning sets.

Norton Tin Plate and Can Company, 8 Post Office ave., Baltimore. Chicago office, 813 Masonic Temple. Works at Boston and Hudson sts. Built in 1895; 16 sets; product, tinplates only, all consumed by the company in the manufacture of tin cans; weekly capacity, 10,000 boxes. Buys black plates. O. W. Norton, President; Edwin Norton, Vice-President; A. L. Fanning, Secretary; L. Bruce Moore, Treasurer. Stickney (The) Iron Company, Baltimore. Office and works at Canton, a suburb of Baltimore, Baltimore county. Built in 1895; 4 sets; product, tinplates; weekly capacity, 1,500 boxes. Fuel, coal. Brand, "Stickney Coke Balto." Makes black plates. (Operated for a short time in 1898 under lease by the Humbert Tin Plate Company; now being operated by The Stickney Iron Company.) *See Rolling Mills in Maryland for a list of officers. See Charcoal Furnaces in Maryland.* Number of tinplate works in Maryland: 4.

VIRGINIA.

Old Dominion Nail Works, Old Dominion Iron and Nail Works Company, Richmond, Henrico county. Works on Belle Isle, in the city of Richmond. Tinning plant added to rolling mill in 1894; first tin and terne plates made in November, 1894; 3 sets, one for tinplates and 2 for terne plates; weekly capacity, 350 boxes of tinplates and 700 boxes of 20 x 28 terne plates. Fuel, bituminous coal. Brands: for tinplates, "Belle Isle" and "Belmont" for charcoal and "Bellevue" and "Belona" for coke; for terne plates, "Chesapeake," "Cherokee," "Mohawk," "Pawnee," "Potomac," "Albemarle," "Greenbrier," "Kanawha," "Rivanna," "Indian," and "York." Buy black plates. *See Rolling Mills in Virginia for a list of officers.*

Number of tinplate works in Virginia: 1.

WEST VIRGINIA.

La Belle Iron Works, Wheeling, Ohio county. Tinning plant added to rolling mill in 1895; first tinplates made in July, 1895, and first terne plates in January, 1896; 15 sets, 13 for tinplates and 2 for terne plates; weekly capacity, triple turn, 8,000 boxes of tinplates and 500 boxes of terne plates. Fuel, natural gas. Brands: for tinplates, "La Belle" for coke and "Woodward A" and "Woodward B" for charcoal; for terne plates, "West Virginia A," "West Virginia B," and "West Virginia Old Style." Make black plates. Expect to erect 2 additional tinning pots. Edwin Jones, Manager Tinning Depart-

ment. Selling agents, Charles E. Pope & Co., Pittsburgh. *See Rolling Mills in West Virginia for a list of officers.*

Wheeling Corrugating Company, Wheeling, Ohio county. Built in 1895; first tin and terne plates made in the spring of 1895; 6 sets for making either tin or terne plates; weekly capacity, double turn, 1,000 boxes of tinplates and 2,000 boxes of terne plates. Fuel, natural gas. Brands: for tinplates, "Ft. Henry," "Ewing," and "Wheeling" for charcoal, and "Thayer" for coke; for terne plates, "Eleanor," "Helen," "Margaret," "Nelson," and "Wylie." Buys black plates. E. C. Ewing, President; Alex. Glass, Secretary.

Number of tinplate works in West Virginia: 2.

KENTUCKY.

Licking Iron Works, Licking Rolling Mill Company, Covington, Kenton county. Tinning plant added to rolling mill in 1895; first terne plates made in March and first tinplates in June, 1895; 4 sets, 1 for tinplates and 3 for terne plates; weekly capacity, 185 boxes of 20 x 28 tinplates and 555 boxes of 20 x 28 terne plates, 216 lbs. to the box. Fuel, coal. Brands, "I. D. L." for coke tinplates and "Droege" for terne plates. Make black plates. *See Rolling Mills in Kentucky for a list of officers.*

Number of tinplate works in Kentucky: 1.

OHIO.

Etna-Standard Iron and Steel Company, Bridgeport, Belmont county. Tinning plant added to rolling mill in 1894; first tin and terne plates made in May, 1894; 8 sets, 6 for tinplates and 2 for terne plates; weekly capacity, 4,750 boxes of 14 x 20 tin and terne plates. Fuel, natural gas and coal. Brands: for tinplates, "Ætna" for coke, and "Ætna," "Ætna A," "Ætna AA," and "Ætna AA1" for charcoal; for terne plates, "Belmont," "Belmont Special," "Belmont Best," and "Standard." Makes black plates. Selling agents, Harrington, Robinson & Co., Boston; A. Schroeder, New York; Simpser & Brother, Philadelphia; H. L. Green & Co., Chicago; Good & Waterman, St. Louis; L. A. Hastings & Co., Denver; T. H. Speddy, San Francisco. *See Rolling Mills and Steel Works in Ohio (Ohio River Counties District) for a list of officers. See Blast Furnaces in Ohio, (Miscellaneous Bituminous list.)*

Alcania (The) Tin and Terne Plate Company, Youngstown, Mahoning county. Built in 1896; first tin and terne plates made in June, 1896; 3 sets; weekly capacity, 750 boxes of tin and terne plates. Fuel, coal. Also makes lead-coated plates. Brands: for tinplates, "Alcania," "Americana," "Columbia," "Sylvania," and "Virginia" for charcoal, and "Alcania," "Helena," and "Wallflower" for coke; for terne

plates, "Columba," "Los Angeles," "Pasadena," "Primrosa," and "Standard A1;" for lead-coated plates, "Ainac," "Alcania," "Cambria," "Hawthorne," "Mahoning," "Mayflower," "Plumbum," and "Supreme." Buys black plates. W. S. Collier, President; W. T. Lewis, Vice-President; T. H. Jeremiah, Secretary and Manager.

American (The) Tin Plate Machine and Manufacturing Company, 328 Chestnut st., Philadelphia. Works at Canal Dover, Tuscarawas county. Built in 1896; first tin and terne plates made in 1896; 3 Buckman automatic continuous seaming and tinning machines and 8 tinning sets, 4 for tinplates and 4 for terne plates; weekly capacity, 5,000 rolls of 100 square feet of terne plates (equal to 1,200 boxes, 20 x 28 plates,) and 1,800 boxes of 14 x 20 tinplates. Fuel, bituminous coal. Brands: for tinplates, "Althea," "Carol," "New Cresta," "Rieka," and "Villette" for charcoal, and "Ariel," "Delta," and "S. J. R." for coke; for terne plates, "Barto," "Crown Old Method," "Eminent Old Method," "Mingo," "Pencoyd," "Preble Extra," and "Sanatoga;" for continuous roofing, "Dover," "Dover Extra," and "Dover Old Method." Buys black plates. George W. Kendrick, 3d, President; S. Y. Buckman, Vice-President and Manager; C. C. Chase, Jr., Secretary; P. B. Calvert, Receiver.

Beaver (The) Tin Plate Company, Lisbon, Columbiana county. Built in 1894-5 and first tin and terne plates made in April, 1895; 10 sets, 8 for tinplates and 2 for terne plates; weekly capacity, double turn, 3,750 boxes of tinplates and 1,000 boxes of terne plates. Fuel, bituminous coal. Brands: for tinplates, "Beaver" coke, and "Beaver A," "Beaver AA," and "Beaver AAA" charcoal; for terne plates, "Beaver," "Beaver Special," "Beaver Extra," and "Beaver Best." Makes black plates. Sales made by the company. *See Rolling Mills in Ohio (Ohio River Counties District) for a list of officers.*

Berger (The) Manufacturing Company, Canton, Stark county. Built in 1896; first terne plates made February 18, 1898; one set; product, terne plates only in 8 and 10-foot lengths; annual capacity, 1,800 gross tons. Fuel, coke. Brands, "Berger's Special," "Berger's AA," "Berger's Empress," "Berger's Roofing," and "Berger's Old Method." Buys black plates. Joseph Biechele, President and Treasurer; Edward Langenbach, Vice-President, Secretary, and Manager.

Britton (The) Rolling Mill Company, 66 Hoyt ave., Cleveland, Cuyahoga county. Tinning plant added to rolling mill in 1893; first tinplates made in March and first terne plates in July, 1893; 4 sets, 3 for tinplates and one for terne plates; weekly capacity, double turn, 1,500 boxes of tin and terne plates. Fuel, petroleum. Brands, for coke and charcoal tinplates and for terne plates, "Britton" and "Buckeye." Makes black plates. *See Rolling Mills in Ohio (Lake Counties District) for a list of officers.*

Cincinnati (The) Corrugating Company, Piqua, Miami county. Built

in 1891 and first terne plates made August 16, 1891; one set, product, terne plates; weekly capacity, 250 boxes. Fuel, coal. Brand, "Piqua." Black plates obtained from The Piqua Rolling Mill Company. James Hicks, President; J. G. Battelle, Secretary and Treasurer. Cincinnati Rolling Mill and Tin Plate Company, 298 East Pearl st., Cincinnati. Works at Riverside, Hamilton county. Tinning plant added to rolling mill in 1897; first tinplates made September 11, 1897; 5 sets; weekly capacity, 1,500 boxes of tin and terne plates. Fuel, coal. Makes black plates. *See Rolling Mills in Ohio (Ohio River Counties District) for a list of officers and selling agents.*

Crescent (The) Sheet and Tin Plate Company, Cleveland, Cuyahoga county. Built in 1894-5; first tin and terne plates made in January, 1896; 10 sets, 8 for tinplates and 2 for terne plates; weekly capacity, triple turn, 5,000 boxes of tinplates and 1,200 boxes of terne plates. Fuel, coal. Brands: for tinplates, "A," "AA," and "AAA" in a crescent for charcoal and "C" in a crescent for coke; for terne plates, "*", "***," and "****" in a crescent. Makes black plates. *See Rolling Mills in Ohio (Lake Counties District) for a list of officers.*

Falcon Tin Plate and Sheet Company, Niles, Trumbull county. Tinning plant added to rolling mill in 1895 and first tin and terne plates made in March, 1895; 12 sets, 5 for tinplates and 7 for terne plates; weekly capacity, 2,000 boxes of tinplates and 2,500 boxes of terne plates ranging from 108 to 135 lbs. to the box. Fuel, bituminous coal. Brands: for tinplates, "Tulip," "Crocus," "Hyacinth," "Jonquil," and "Daisy" for charcoal and "Clover" for coke; for terne plates, "Official Seal," "Cornflower," "Sweet Brier," "Holly Wood," "Golden Rod," "Mayflower," "Moonflower," "Starflower," "Sunflower," and "Wildflower." Makes black plates. *See Rolling Mills in Ohio (Mahoning Valley) for a list of officers and selling agents.*

Irondale Tin and Terne Plate Works, Wallace, Banfield & Co., Irondale, Jefferson county. Branch office, 246 Third ave., Pittsburgh. Tinning plant added to rolling mill in 1891; enlarged in 1892; 6 sets and 4 automatic tinning machines; product, tin and terne plates; weekly capacity, 2,800 boxes of tinplates and 200 boxes of terne plates. Fuel, coal. Brands: for tinplates, "*B," "*A," "*AA," and "*AAA" for charcoal, and "*C" and "*BC" for coke; for terne plates, Diamond "B," "A," "AA," "AAA," "WB," and "OS." Make black plates. *See Irondale Rolling Mill in Ohio, (Ohio River Counties.)*

Laughlin Nail Company, Wheeling, West Virginia. Works at Martin's Ferry, Belmont county. Tinning plant added to rolling mill in 1895 and enlarged in 1896-7; first tin and terne plates made August 29, 1895; 27 sets for tinplates; weekly capacity, 12,000 boxes of 100 lbs. each. Fuel, coal. Brand, "Laughlin." Makes black plates. *See Rolling Mills in Ohio (Ohio River Counties District) for a list of officers.*

McDonald (The James) and Sons Company, Cincinnati, Hamilton coun-

ty. Built in 1894 and first terne plates made in August, 1894; 2 sets; product, terne plates; weekly capacity, 300 boxes of 20 x 28 plates. Fuel, coal. Brands, "Eureka," "Special Redipped," "The James McDonald and Sons Co. Old Style," "Cadot's Old Style," "Clyde," "Reinert Redipped," and "Enders Old Style." Buys black plates. James McDonald, Sr., President; Henry McDonald, Vice-President; Edward McDonald, Secretary; James McDonald, Jr., Treasurer. Sales made by the company.

Morton Tin Plate Works, The Morton Tin Plate Company, Cambridge, Guernsey county. Built in 1894; first tin and terne plates made in March, 1895; 6 sets, 4 for tinplates and 2 for terne plates; weekly capacity, 2,000 boxes of tinplates and 1,000 boxes of terne plates. Fuel, natural gas. Brands: for tinplates, "Guernsey," "Morton," "Regent," and "White Rose" for charcoal, and "Cambridge" and "Thistle" for coke; for terne plates, "American Standard," "Cambridge Old Style," "Cambridge New Method," "Leatherwood," "Economy," "North Star," "Neptune," "Paragon," and "Cambridge Redipped." Make black plates. Sales made by the company. *See Rolling Mills in Ohio (Interior Counties District) for a list of officers.*

Record Manufacturing Company, Conneaut, Ashtabula county. Built in 1891; first tinplates made March 1, 1892; 2 sets; product, tinplates; weekly capacity, 480 boxes. Fuel, coal. Brands, "Record Charcoal A" and "Record Charcoal A 1" for charcoal and "Record Coke" for coke. Buys black plates. George J. Record, proprietor. Sales made by the company.

Simpson (W. T.) & Co., 298 East Pearl st., Cincinnati. Works at Riverside, Hamilton county. Built in 1891 and first terne plates made in November, 1891; 3 sets; product, terne plates; weekly capacity, 600 boxes of 216 lbs. each. Fuel, coal. Brands, "Boaz," "Queen City Old Style," and "Riverside." Black plates supplied by the Cincinnati Rolling Mill and Tinplate Company.

Number of tinplate works in Ohio: 16.

INDIANA.

American (The) Tin Plate Company, Elwood, Madison county. Two works: Elwood Works, built in 1891-2 and first tin and terne plates made in July, 1892; 54 sets; weekly capacity, double turn, 30,000 boxes of tin and terne plates; also various weights of tinplates. Montpelier Works, Montpelier, Blackford county, built in 1895 and first tin and terne plates made in June, 1895; 12 sets; 11 for tinplates and one for terne plates; weekly capacity, double turn, 3,000 boxes of tinplates and 250 boxes of terne plates, 20 x 28, 216 lbs. to the box; (formerly operated by The Montpelier Sheet and Tin Plate Company.) Fuel, natural gas. Brands: for tinplates, "Hazen,"

"Premier," "Imperial," and "Peerless" for charcoal, and "Hazen," "Kream," "Kanner," "L-Wood," and "Koko" for coke; for terne plates, "L-e-e-d-s," "E-l-w-o-o-d," "I-n-d-i-a-n-a," and "R-e-i-d." Both works make black plates, which are all consumed by the company. Sales made by the company at 1118 Marquette Building, Chicago. *See Rolling Mills in Indiana for a list of officers.*

Atlanta (The) Steel and Tin Plate Company, (successor to The Indiana Tinplate Manufacturing Company,) Atlanta, Hamilton county. Built in 1892-3; first tinplates made in March and first terne plates in April, 1893; 7 sets, 5 for tinplates and 2 for terne plates; weekly capacity, 3,000 boxes of tinplates and 1,500 boxes of terne plates. Fuel, natural gas. Brand, "Atlanta" for coke tinplates and for terne plates. Makes black plates and sheets. Sales made by the company. *See Rolling Mills in Indiana for a list of officers.*

Gas City Tinplate Works, The Morewood Company, Gas City, Grant county. Built in 1893; first terne plates made in June and first tinplates in December, 1893; 17 sets, 14 for tinplates and 3 large ones for terne plates; weekly capacity, 5,000 boxes of tinplates and 1,200 boxes of terne plates. Fuel, natural gas. Brands: for tinplates, "R. H. J." for coke, and "Jack," "Grace," and "Dorothy" for charcoal; for terne plates, "F. W. B.," (old style,) "J. H. R.," and "P. T. L." Make black plates. Sales made by the company. *See Rolling Mills in Indiana for a list of officers.*

Irondale (The) Steel and Iron Company, Richmond: Works at Midletown, Henry county. Built in 1894; first tin and terne plates made in November, 1894; 10 sets, 8 for tinplates and 2 for terne plates; weekly capacity, 4,000 boxes of tinplates and 1,000 boxes of terne plates. Fuel, natural gas. Brands: for tinplates, "Albright," "Crane Charcoal," and "Crane Diamond C.;" for terne plates, "Crane Old Style," "Crane," and "Crane Extra Coated." Makes black plates. *See Rolling Mills in Indiana for a list of officers.*

National (The) Tin Plate Company, Anderson, Madison county. Built in 1894-5 and first tin and terne plates made in August, 1895; 11 sets; weekly capacity, 6,000 boxes of tin or terne plates. Fuel, natural gas. Brands: for tinplates, "Donner," "Irwin," "Matter," and "Eagle" for charcoal, and "Anderson" and "National" for coke. Makes black plates. Sales made by the company. *See Rolling Mills in Indiana for a list of officers.*

Number of tinplate works in Indiana: 6.

ILLINOIS.

Chicago (The) Stamping Company, Congress and Green sts., Chicago. Original works erected in 1865; first tinplates made in January, 1894; 3 sets; product, tinplates for its own use only; weekly capacity, 600

boxes. Fuel, oil. Buys black plates. Lee Sturges, President and Treasurer; W. H. Burn, Secretary.

Great Western Tin Plate Company, Northern Office Building, Chicago. Works at Joliet, Will county. Tinning plant added to rolling mill in 1895; first tin and terne plates made in March, 1895; 8 sets, 6 for tinplates and 2 for terne plates; weekly capacity, double turn, 3,000 boxes of tin or terne plates. Fuel, oil. Brands: for tinplates, "Moose" for charcoal and "Elk" for coke; for terne plates, "Duck," "Drake," and "Swan." Makes black plates. Sales made by the company. *See Rolling Mills in Illinois (Joliet Sheet Mill) for a list of officers.*

Norton Brothers, 813 Masonic Temple, Chicago. Works at Maywood, Cook county. Built in 1891; 18 Norton automatic sets; product, tinplates, all used by the firm in the manufacture of cans; weekly capacity, 10,000 boxes of 14 x 20 plates. Buy black plates. *See Rolling Mills in Illinois for a list of officers.*

Number of tinplate works in Illinois: 3.

MICHIGAN.

Buhl Stamping Company, Detroit, Wayne county. Tinning plant erected in 1888 and rebuilt in 1895 and 1897; product consumed by the company in the manufacture of milk-can stock, tubular lanterns, and gas meters. Fuel, coal. Buys black plates. Theo. D. Buhl, President; Charles H. Jacobs, Vice-President and Managing Director; D. C. Delamater, Secretary; J. M. Thurber, Treasurer; Thomas W. Forster, Superintendent.

Number of tinplate works in Michigan: 1.

MISSOURI.

Granite Iron Rolling Mills, St. Louis Stamping Company, Cass ave. and Second st., St. Louis. Works at Second and Destrehan sts. Tinning plant added to rolling mill in 1890; first tinplates made in November, 1890, and first terne plates in March, 1891; 14 sets, 8 for tinplates and 6 for terne plates; weekly capacity, 3,600 boxes of tinplates and 2,000 boxes of terne plates. Fuel, coal. Brands: for tinplates, "Granite" and "St. Louis" for charcoal and "Steel Coke" for coke; for terne plates, "Acme Old Method," "Alta," "Ex. Fine," and "S. L. S. Old Process." Make black plates. Sales made by the company. *See Rolling Mills in Missouri for a list of officers.*

Number of tinplate works in Missouri: 1.

UNITED STATES.

Number of tinplate works in the United States in April, 1898: 69 completed, 1½ building, and 1 projected. In addition 1 works make pure lead-coated sheets.

FORGES AND BLOOMARIES.

Under the title of forges are embraced all works which make wrought iron direct from ore. Under the title of bloomaries are embraced all works which hammer blooms from pig or scrap iron for sale. Many plate, sheet, and rod makers have charcoal forge fires in their mills making blooms exclusively for their own use, but such establishments are not included in this list. Capacity is given on double turn and in gross tons of 2,240 pounds.

FORGES.

NEW YORK—2, LOCATED IN THE LAKE CHAMPLAIN DISTRICT.

Chateaugay Ore and Iron Company, Plattsburgh, Clinton county. Two works: Russia Iron Works, built at Moffittsville, Clinton county, in 1844; enlarged in 1883; 7 fires and one hammer. Standish Iron Works, at Standish, Clinton county; built in 1895; 8 fires and one hammer. Russia Iron Works run by water-power; Standish by steam-power. Product, charcoal blooms for general purposes and charcoal billets for crucible-steel melting stock of high grade, both made from Chateaugay ore; total annual capacity, 4,000 gross tons.

NORTH CAROLINA—1.

Helton Forge, W. J. Pasley, Crumpler, Ashe county. Built in 1859; 2 fires and 1 hammer; product, bar iron; annual capacity, 75 gross tons.

TENNESSEE—1.

Harriman (The) Wrought Iron Company, 76 Montgomery st., Jersey City, N. J. Experimental plant built at Harriman, Roane county, Tenn., in 1891 for the production of wrought iron direct from the ore by the Neville process. E. K. Seguire, President; A. A. Hopkins, Vice-President; P. W. Levering, Secretary and Treasurer. Idle.

BLOOMARIES.

NEW JERSEY—1.

Paterson Bloomary, Isaac P. Oberg, Paterson, Passaic county. Built in 1878; 4 fires and one hammer; product, cold-blast charcoal blooms and charcoal iron for boiler plate and wire made from scrap iron; annual capacity, 2,250 gross tons. Idle.

PENNSYLVANIA—8.

- Eagle Forge, Curtins & Co., Roland, Centre county. Telegraph address, Bellefonte. Built in 1809; 8 fires and one hammer; water-power; product, blooms for general purposes made from charcoal pig iron; specialty, blooms for boiler plate and rivet and screw rods; annual capacity, 1,800 gross tons. Idle and for lease.
- Exeter Steam Forge, Reuben B. Seidel, Exeter Station, Berks county. Built in 1868, burned in 1894, rebuilt in the same year, and operations resumed January 1, 1895; one heating furnace and one 1,500-lb. hammer; steam-power; product, bars and forgings made from charcoal blooms and wrought-iron scrap; annual capacity, 300 gross tons. Fuel, bituminous coal.
- French Creek Forge, Esther Kaufman, St. Peter's P. O., Chester county. Built in 1872; 4 fires and one hammer; water and steam power; product, charcoal blooms made from scrap iron; annual capacity, 800 gross tons. Thomas Wanner, Attorney.
- Laurel Forge, South Mountain Mining and Iron Company, Pine Grove Furnace, Cumberland county. Built in 1830; 6 fires, 1 double run-out, and 1 hammer; water-power; product, charcoal blooms made from Pine Grove pig iron; annual capacity, 1,800 gross tons. Joseph Fuller, Superintendent. *See Pine Grove (charcoal) Furnace in Pennsylvania.*
- Lucknow Forge, Lucknow Forge Company Limited, Fort Hunter P. O., Dauphin county. Forge at Lucknow Station, P. R. R., 4 miles west of Harrisburg; 9 forge fires, one run-out, and one steam hammer; product, blooms for boiler plate, sheet iron, wire, tube, skelp, tin-plates, etc., made from pig and scrap iron; annual capacity, 5,400 gross tons.
- Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Built in 1830; 7 fires and one hammer; water-power; product, charcoal blooms for boiler plate and best wire, made from pig iron; annual capacity, 2,500 gross tons. Wire used for flat and round head wood-screws and carriage bolts. *See Hecla (charcoal) Furnace in Pennsylvania. See Milesburg Iron Works, Central Pennsylvania Rolling Mills.*
- Mont Alto Iron Works, Mont Alto Iron Company, David Knepper, Receiver, Mont Alto, Franklin county. Telegraphic connection with Western Union office at Chambersburg. Built in 1866; 8 Wiestling's patent improved Lancashire hearths and a double run-out fire; one Nasmyth steam hammer and one self-acting steam helve hammer; product, charcoal blooms for all purposes requiring best quality of iron; annual capacity, 3,600 gross tons. Brand, "Mont Alto." General office at the works; all sales made by David Knepper, Receiver. *See Mont Alto (charcoal) Furnace in Pennsylvania.*
- Spring City Bloom Works, Spring City, Chester county. Built in 1884; 6 forge fires and one hammer; product, blooms for plate and sheet iron made from scrap iron; daily capacity, 12 gross tons. S. H.

Egolf, President ; Willis Rogers, Secretary ; Milton Latshaw, Treasurer ; H. S. Hallman, Manager.

MARYLAND—1.

Principio Forge, Principio Forge Company, lessee, Principio Furnace P. O., Cecil county. Telegraph address, Perryville. Built in 1883-4 ; 12 fires, one heating furnace, and one hammer ; coke run-out attached ; steam-power used throughout ; product, charcoal blooms for boiler tubes, used by The Tyler Tube and Pipe Company, of Washington, Pa. ; annual capacity, 8,000 gross tons. N. E. Whitaker, President. Owned by the Whitaker Iron Company, Wheeling, W. Va. Number of iron-ore forges in the United States in April, 1898 : 4 ; number of pig and scrap iron bloomaries, 10 : total, 14.

FORGES AND BLOOMARIES RECENTLY ABANDONED.

A list of forges and bloomaries which have long been abandoned will be found in the Directories for 1892, 1894, and 1896.

NEW YORK.

Chateaugay Ore and Iron Company, Plattsburgh, Clinton county. Three works : Plattsburgh Iron Works, built at Plattsburgh in 1879 as a rolling mill ; converted into a forge in 1883. Chateaugay Lake Iron Works, built at Chateaugay Lake in 1875. Clayburgh Iron Works, built at Clayburgh in 1844 ; rebuilt and enlarged in 1883. Product, charcoal blooms for general purposes and charcoal billets for crucible steel-melting stock. Abandoned.

PENNSYLVANIA.

Cove Forge, Wm. McIlvain & Sons, Reading. Works at Duncannon, Perry county. First put in operation in 1864 ; product, charcoal blooms for general purposes, made from pig iron ; abandoned. Howard Iron Works, Howard, Centre county. Built in 1879 ; product, charcoal blooms ; dismantled. Springton Forge, Wallace, Chester county. Built in 1790 and rebuilt in 1881 ; product, charcoal blooms ; abandoned.

ALABAMA.

Anniston Bloomary, Mrs. Mary B. Chichester, Leesburg, Virginia. Works at Anniston, Calhoun county. Built in 1887 ; product, blooms made from pig iron ; abandoned.

CUT-NAIL WORKS.

This list embraces all rolling mills and other establishments in the United States which have cut-nail machines. Almost all the establishments named make standard sizes of nails. A number of the works make cut spikes as well as cut nails; some of them also make cut tacks. Capacities are given on single turn except where otherwise stated. Works making forged spikes are not included in the list. For a complete description of nearly all the works named below see the list of rolling mills and steel works beginning on page 73.

MASSACHUSETTS—4.

Anthony and Cushman Tack Company, Taunton. Sizes, 3-inch and smaller and all sizes of tacks. Number of nail and tack machines, 78. Annual capacity, 24,000 kegs.

Mount Hope Iron Works, Mount Hope Iron Company, Somerset. 100 nail machines. Annual capacity, 140,000 kegs.

Robinson Iron Company, Plymouth. 18 nail machines. Annual capacity, 26,000 kegs.

Tremont Nail Works, Tremont Nail Company, West Wareham. 150 nail machines. Annual capacity, 200,000 kegs of steel nails.

CONNECTICUT—1.

Shelton Company, Derby. Sizes, trunk, clout, finishing, hoop, barrel, and lath nails. Number of nail machines, 25.

NEW JERSEY—2.

Cumberland Nail and Iron Company, Bridgeton. Branch office, 207 Walnut Place, Philadelphia. 90 nail machines. Annual capacity, 140,000 kegs.

Oxford Iron and Nail Works, Oxford. 103 nail machines. Annual capacity, 200,000 kegs of iron nails. Idle and for sale.

PENNSYLVANIA—20.

Anchor Nail and Tack Works and Central Expanded Metal Company, Chess Brothers, 531 Wood st., Pittsburgh. 90 nail machines. Annual capacity, 200,000 kegs. Idle.

Atlantic Iron and Steel Company, New Castle. 55 nail machines. Nail factory idle since 1888 and not likely to be operated again.

- Bellefonte Iron and Nail Works, The Commonwealth Guarantee, Trust, and Safe Deposit Company, trustee, Harrisburg. Works at Bellefonte. 53 nail machines. Annual capacity, 125,000 kegs of nails and spikes. For sale or lease.
- Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro. 118 nail machines. Annual capacity, 250,000 kegs.
- Chesapeake Nail Works, Charles L. Bailey & Co., (incorporated,) Harrisburg. 103 nail machines. Annual capacity, 260,000 kegs of iron and steel nails.
- Dalmatia Nail Works, Johnson & Co., Dalmatia, Northumberland county. 22 nail machines. Steel nails.
- Danville Nail Works, C. R. Baird & Co., Bullitt Building, Philadelphia. Works at Danville. 92 nail machines. Annual capacity, 250,000 kegs of iron and steel nails. Idle and for sale or lease.
- Duncannon Iron Works, The Duncannon Iron Company, Duncannon. Office, 122 Race st., Philadelphia. 50 nail machines. Annual capacity, 125,000 kegs of iron and steel nails.
- Hollidaysburg Iron and Nail Company, Hollidaysburg. 23 nail machines. Annual capacity, 60,000 kegs of cut nails and spikes.
- Juniata Rolling Mill, Hollidaysburg. 30 nail machines. Annual capacity, 150,000 kegs of cut nails and spikes. For sale or lease.
- Keystone Nail Works, Ellis and Lessig Steel and Iron Company Limited, Pottstown. 105 nail machines. Annual capacity, 300,000 kegs of iron and steel nails.
- Kimberly (The P. L.) Company, Sharon. Atlantic Works, at Sharon. 40 nail machines. Annual capacity, 100,000 kegs.
- Lewisburg Rolling Mill, Lewisburg. 41 nail machines. Annual capacity, 125,000 kegs. Idle and for sale or lease.
- Milton Nail Works, F. A. Godcharles Company, Milton. 89 nail machines. Annual capacity, 200,000 kegs of iron and steel cut nails and spikes.
- Northumberland Iron and Nail Works, Van Alen & Co., Northumberland. 94 nail machines. Annual capacity, 250,000 kegs of iron and steel nails.
- Plymouth Rolling Mill, J. Wood and Brothers Company, Conshohocken. 12 nail machines. Nail department idle.
- Pottstown Iron Works, Glasgow Iron Company, lessee, Pottstown. Philadelphia office, Fidelity Building. 95 nail machines. Annual capacity, 250,000 kegs.
- Sunbury Iron Works, Sunbury. 41 nail machines. Annual capacity, 120,000 kegs.
- Watsonstown Nail Works, D. C. Kaseman & Co., Watsonstown. 47 nail machines. Annual capacity, 70,000 kegs of iron and steel nails.
- Williamsport Iron and Nail Company, Williamsport. 80 nail machines. Annual capacity, 150,000 kegs of iron and steel nails.

MARYLAND—1.

Clendenin Brothers, 111 South Gay st., Baltimore. Sizes, up to and including 6-inch spikes. Number of nail machines, 20. Annual capacity, 24,000 kegs of nails and spikes.

VIRGINIA—1.

Old Dominion Nail Works, Old Dominion Iron and Nail Works Company, Richmond. 137 nail machines. Annual capacity, 300,000 kegs of iron and steel nails and spikes.

WEST VIRGINIA—5.

La Belle Iron Works, Wheeling. 173 nail machines. Annual capacity, 400,000 kegs of iron and steel nails.

Riverside Iron Works, Wheeling. 224 nail machines. Annual capacity, 550,000 kegs of steel nails.

Wheeling Steel and Iron Company, Wheeling. Three nail factories: Belmont Works, at Wheeling; 152 nail machines; annual capacity, 350,000 kegs of steel nails. Benwood Works, at Benwood; 130 nail machines; annual capacity, 300,000 kegs of steel nails. Top Mill, at Wheeling; 130 nail machines; annual capacity, 300,000 kegs of steel nails and spikes.

KENTUCKY—1.

Norton Iron Works, Ashland. 126 nail machines. Annual capacity, 350,000 kegs of steel nails and spikes; also wrought spikes.

TENNESSEE—2.

Harriman Tack Company, Harriman. Small nails and tacks of all sizes. Number of nail and tack machines, 38. Annual capacity, 6,000 kegs of small nails and tacks.

Knoxville Iron Company, Knoxville. 41 nail machines. Idle.

ALABAMA—1.

Alabama Iron and Steel Company, A. J. Perry, Receiver, Brierfield, Bibb county. 72 nail machines. Iron nails.

OHIO—5.

Belfont Iron Works, Belfont Iron Works Company, Ironton. 126 nail machines. Annual capacity, 300,000 kegs of iron and steel and of combined iron and steel nails.

Jefferson Iron Works, S. K. Wallace, Receiver, Steubenville. 128 nail machines. Annual capacity, 400,000 kegs of steel nails.

Kelly Nail and Iron Company, Ironton. 120 nail machines. Annual capacity, 250,000 kegs of iron and steel nails and spikes.

Laughlin Nail Company, Wheeling, W. Va. Works at Martin's Ferry.

225 nail machines. Annual capacity, 625,000 kegs of steel nails and spikes.

Mahoning Valley Works, The Mahoning Valley Iron Company, Youngstown. 55 nail machines. Annual capacity, 180,000 kegs of steel nails.

INDIANA—3.

Lakeside Nail Company, First National Bank Building, Chicago. Works at Hammond. 202 nail machines. Annual capacity, 600,000 kegs.

Terre Haute Iron and Steel Company, Terre Haute. Chicago office, 133-35 South Clinton st. 64 nail machines. Idle.

Tower (The) Manufacturing Company, Madison. All sizes of iron nails. Number of nail machines, 25. Annual capacity, about 60,000 kegs.

ILLINOIS—6.

Belleville Tack Works, Belleville. Sizes, 30-penny and smaller. Number of nail machines, 14. Annual capacity, 20,000 kegs.

Calumet Works, Calumet Iron and Steel Company, Rookery Building, Chicago. Works at South Chicago. 132 nail machines. Idle. I. T. Hartz, Receiver, Rookery Building, Chicago.

Grand Crossing Tack Company, Grand Crossing, Chicago. Sales offices: 23 Davis st., San Francisco, Cal.; 562 Victoria, Buenos Ayres, Argentine Republic; 57 Gen. Camara, Rio de Janeiro, Brazil. Sizes, 10-penny and smaller. Number of nail machines, 90. Annual capacity, 100,000 kegs.

Hartmann, Hay & Reis, Belleville. 61 nail machines. Annual capacity, 150,000 kegs.

Stanley (The George W.) Company, Belleville. Sizes, from $\frac{1}{2}$ -inch to 2-inches. Number of nail machines, 15. Annual capacity, 7,500 kegs.

Valley Steel Company, Belleville. Office, American Central Building, St. Louis, Mo. 85 nail machines. Annual capacity, 200,000 kegs of steel nails.

MISSOURI—1.

St. Joseph Bar and Axle Company, St. Joseph. 50 nail machines. Annual capacity, 200,000 kegs of steel nails. Idle.

CALIFORNIA—2.

Judson Manufacturing Company, Oakland. Office and salesroom, cor. Howard and Beale sts., San Francisco. 15 nail machines. Annual capacity, 25,000 kegs.

Pacific Iron and Nail Company, 132 Market st., San Francisco. Works at Oakland. 50 nail machines. Iron nails, steel nails from imported slabs, and combined iron and steel nails.

UNITED STATES.

Total number of cut-nail and cut-spike works in the United States in April, 1898: 55. Number of cut-nail and cut-spike machines: 4,544.

WIRE-ROD AND WIRE MILLS.

The works which do not draw wire but which roll rods are indicated by the word "rods" placed after their names; all others draw wire. For a more complete description of the rod mills see the list of rolling mills and steel works beginning on page 73. Some of the wire works in this list make copper and brass wire as well as iron and steel wire. The gross ton of 2,240 pounds is used in giving capacities.

MASSACHUSETTS—12.

- Gurney, (D. B.,) Whitman. Annual capacity, 1,000 tons of wire.
- Lamb (Horace) & Co., Northampton. Annual capacity, from 275 to 300 tons of wire.
- Plymouth (The) Mills, Plymouth. Annual capacity, 1,500 tons of wire for their own use.
- Prentiss (George W.) & Co., Holyoke. Product, all sizes of wire but principally fine wire. Annual capacity, 1,500 tons.
- Prouty Wire Company, Charlton City. Product, fine wire and best quality of Swedes iron wire. Annual capacity, 150 tons.
- Spencer Wire Company, Spencer. Sizes, $\frac{5}{16}$ of an inch to No. 60 iron wire gauge. Annual capacity, 2,000 tons. Product, fine wire, chains, and bottler's loops.
- Taunton Tack Company, branch of the Atlas Tack Company, Taunton. Sizes, from $\frac{1}{2}$ of an inch to No. 22 Stubs's gauge. Annual capacity, 1,500 tons of wire.
- Washburn and Moen Manufacturing Company, Worcester. Two works, one of which rolls rod. Product, rods and wire; annual capacity: rods, 115,000 tons; wire, 100,000 tons. *See Waukegan Works in Illinois.*
- Worcester Wire Company, Worcester. Sizes, from $\frac{1}{2}$ of an inch to No. 33 gauge. Annual capacity, 20,000 tons. Product, bright, coppered, tinned, and annealed wire.
- Wright and Colton Wire Cloth Company, Worcester. Two works: Wire Cloth Mills, at Worcester; annual capacity, 3,000 tons. Palmer Wire Mills, at Palmer; annual capacity, 2,500 tons. Sizes, from $\frac{3}{8}$ of an inch to No. 32 gauge. Product, wire for wire cloth, screws, poultry netting, riddles, screens, etc.

RHODE ISLAND—1.

- American Screw Company, Providence. Product, wire for screws, bolts, rivets, nails, etc.

CONNECTICUT—5.

- Ansonia (The) Brass and Copper Company, Ansonia. Draws iron, steel, and zinc wire, but principally brass and copper wire.
- Gilbert and Bennett (The) Manufacturing Company, Georgetown. Sizes, from rod down to No. 36 gauge. Annual capacity, 2,000 tons. Product, wire for wire cloth, netting, etc. *See Illinois.*
- Hartley, (George,) 50 Jefferson st., Waterbury. Draws wire for hair springs, drills, and scratch brushes. Sizes, from .040 to .005 gauge.
- New Haven Rolling Mill Company, New Haven. Rods. Annual capacity, 4,500 tons.
- New Haven (The) Wire Manufacturing Company, 256 Water st., New Haven. Works on Fairmount avenue. Sizes, from $\frac{1}{2}$ -inch to No. 35 gauge. Annual capacity, about 11,000 tons of wire.

NEW YORK—8.

- Giese, (Rudolf,) 162-64 West Twenty-seventh st., New York City. Works at Dolgeville. Annual capacity, 95 tons of steel wire for springs and musical instruments.
- Griswold, (J. Wool,) Troy. Annual capacity, 3,600 tons of wire.
- Igoe Brothers, 470 Driggs avenue, Brooklyn. Sizes, from $\frac{3}{8}$ of an inch to No. 20 gauge. Annual capacity, 2,000 tons of wire.
- Newburgh (The) Wire and Nail Company, Newburgh, Orange county. Rods. Annual capacity, 27,000 tons. Idle.
- Palatine Wire Company, lessee, 253 Broadway, New York. Works at Newburgh. Product, wire for barbed wire, wire nails, staples, etc.
- Syracuse Steel Wire Company, Syracuse.
- Wickwire Brothers, Cortland. Annual capacity, 2,000 tons of wire, all consumed in their own works in making wire cloth, nettings, etc.
- Wolff (R. H.) & Co. Limited, foot of East 118th st., New York City. Product, all kinds of fine iron and steel wire.

NEW JERSEY—5.

- Benjamin (The) Atha and Illingworth Company, Harrison, Hudson county. Steel rods. Annual capacity, 5,000 tons.
- Roebing's (John A.) Sons Company, Trenton. Rods and wire. Annual capacity, 36,000 tons of rods and 32,000 tons of wire.
- Spaulding and Jennings (The) Company, (West Bergen Steel Works,) Jersey City. Rods and wire. Rods all consumed by the company in its own works in the manufacture of wire. Annual capacity, 2,000 tons of wire.
- Stewart Hartshorn Company, East Newark. Draws wire for its own use in the manufacture of shade and other rollers. Annual capacity, 1,000 tons.
- Trenton (The) Iron Company, Trenton. Rolls rods and draws all sizes of wire. Annual capacity, 18,000 tons of rods and 20,000 tons of wire.

PENNSYLVANIA—18.

- American Steel and Wire Company, general office, Rookery Building, Chicago. Three works: Allentown works, at Allentown; rods and wire; sizes of wire, No. 00 to No. 20 gauge; annual capacity: rods, 75,000 tons; wire, 65,000 tons. Pittsburgh works, at Rankin Station, Allegheny county; rods and all sizes of wire; annual capacity: rods, 100,000 tons; wire, 70,000 tons. Beaver Falls Works, at Beaver Falls; rods and all sizes of wire; annual capacity: rods, 100,000 tons; wire, 65,000 tons. *See Ohio, Indiana, Illinois, and Missouri.*
- Cambria Iron Company, Harrison Building, Philadelphia. Works at Johnstown. Rods. Annual capacity, 27,000 tons.
- Carpenter Steel Works, Carpenter Steel Company, Reading. New York office, 1 Broadway. Roll rods for their own use in the manufacture of flat steel wire for hats, clocks, band-saws, corsets, etc. Annual capacity, 1,000 tons of wire.
- Globe Wire Company Limited, Sharpsburg. High-grade tool steel, drill rods, and needle wire. Sizes, from .008 to $1\frac{1}{4}$ inches. Annual capacity, 300 tons.
- Hazard (The) Manufacturing Company, Wilkesbarre. Draws wire for its own use in the manufacture of iron, steel, and galvanized wire rope. Annual capacity, 4,000 tons.
- Kidd (The) Brothers and Burgher Steel Wire Company, McKees Rocks. Sizes, $1\frac{1}{8}$ inch round to .006 inch round. Product, all kinds of tool steel wire. Annual capacity, 400 tons.
- Milesburg Iron Works, McCoy & Linn, Milesburg. Iron rods. Annual capacity, 1,350 tons. Draws iron wire for its own use only.
- New Castle Wire Nail Works, Shenango Valley Steel Company, New Castle. Rods and wire. Annual capacity, 90,000 tons of rods and 75,000 tons of wire.
- Norristown Wire Company, Norristown. Sizes, from $\frac{1}{2}$ of an inch to No. 30 gauge. Annual capacity, 3,000 tons of wire.
- Oliver Wire Company, 1001 Muriel st., Pittsburgh. Steel rods and wire. Sizes of wire, from $\frac{3}{8}$ of an inch to No. 20 gauge. Annual capacity: rods, 90,000 tons; wire, 100,000 tons.
- Philadelphia Wire Works, Thomas Hamilton's Sons, 1340-52 Vienna st., Philadelphia. Product, market wires from No. 000 to No. 36 gauge. Annual capacity, 1,400 tons.
- Philips, Townsend & Co., North Penn Junction, Philadelphia. Annual capacity, from 9,000 to 10,000 tons of wire.
- Pittsburgh Wire Company, Braddock. Branch office, 232 Fifth ave., Pittsburgh. Bessemer and basic open-hearth steel rods and wire. Sizes of wire, from $\frac{3}{4}$ of an inch down to $\frac{1}{32}$ of an inch in diameter. Annual capacity, 55,000 tons of wire.
- Portage Iron Company Limited, Duncansville, Blair county. New York office, A. R. Whitney & Co., 29 Broadway. Rods and wire. Sizes of

wire, from $\frac{3}{8}$ of an inch to No. 20 gauge. Annual capacity, double turn: rods, 30,000 tons; wire, 30,000 tons.

Stewart Wire Works, Stewart Wire Company, Easton. Works at South Easton. Sizes of wire: steel, from $\frac{3}{8}$ of an inch to No. 36 gauge; iron, from $\frac{3}{8}$ of an inch to No. 36 gauge. Product, bright, annealed, coppered, and tinned wire. Annual capacity, 20,000 tons.

Townsend, (C. C. & E. P.,) New Brighton. Works at Fallston. Sizes, No. 0000 gauge and smaller. Annual capacity, 10,000 tons. Product, wire for nails, rivets, hooks, blanks, etc.

WEST VIRGINIA—1.

Columbia Barb Wire and Nail Works, D. A. Chenoweth, Indianapolis, Indiana. Works at Kanawha City. Annual capacity, 18,000 tons of wire. Works now idle, but may be put in operation in 1898.

KENTUCKY—1 PROJECTED.

Ashland Steel Company Incorporated, Ashland. Contemplates adding to its works a wire-rod mill and a wire-drawing plant.

OHIO—8.

American Steel and Wire Company, general office, Rookery Building, Chicago. Five Works: Consolidated Works, at Cleveland; rods and wire; sizes of wire, from rod down to No. 19 gauge; annual capacity: steel rods, 60,000 tons; wire, 80,000 tons. American Works, at Cleveland; rods and wire; sizes of wire, from $\frac{7}{8}$ of an inch down to No. 50 gauge; annual capacity: steel rods, 100,000 tons; wire, 45,000 tons. H P Nail Works, at Cleveland; rods and wire; sizes of wire, from 1-inch shafting down to No. 25 gauge; annual capacity: steel rods, 60,000 tons; wire, 60,000 tons. Findlay Works, at Findlay; sizes of wire, from rod down to No. 19 gauge; annual capacity, 38,000 tons, chiefly consumed by the works in the manufacture of wire nails. Salem Works, at Salem; sizes of wire, from rod down to No. 21 gauge; annual capacity, 36,000 tons, chiefly consumed by the works in the manufacture of wire nails. *See Pennsylvania, Indiana, Illinois, and Missouri.* Cincinnati (The) Barbed Wire Fence Company, Fairmount, Cincinnati. Annual capacity, from 55,000 to 60,000 tons of wire, chiefly consumed by the company in its own works in the manufacture of wire nails and barbed, plain, and galvanized fence wire.

Cleveland Rolling Mill Company, Western Reserve Building, Cleveland.

Rods and wire. Annual capacity: rods, 100,000 tons; wire, 90,000 tons.

New Philadelphia Wire Nail Works, New Philadelphia. Annual capacity, 16,000 tons of wire. Idle.

INDIANA—2.

Alexandria Wire Nail Company, Alexandria. Draws steel wire for its own use in the manufacture of wire nails.

Anderson Works, American Steel and Wire Company, Rookery Building, Chicago. Works at Anderson. Rods and wire. Sizes of wire, from No. 000 to No. 21 gauge inclusive. Annual capacity: steel rods, 75,000 tons; wire, 70,000 tons. *See Pennsylvania, Ohio, Illinois, and Missouri.*

ILLINOIS—12 COMPLETED AND 1 BUILDING.

American Steel and Wire Company, general office, Rookery Building, Chicago. Three works: Joliet Works, at Joliet; sizes, from No. 00 to No. 22 gauge inclusive; annual capacity, 100,000 tons of wire. Rockdale Works, at Rockdale, near Joliet; sizes, from No. 2 to No. 22 gauge inclusive; annual capacity, 65,000 tons of wire. Ellwood Works, at De Kalb; sizes, from No. 0 to No. 20 gauge; annual capacity, 75,000 tons of wire. *See Pennsylvania, Ohio, Indiana, and Missouri.*

Continental Wire Company, Laclede Building, St. Louis, Mo. Works at Granite City. Sizes, from No. 0 to No. 16 gauge of steel wire. Annual capacity, 22,500 tons. Product, market wire, annealed and galvanized barbed wire, hog and cattle wire, etc.

Dillon-Griswold Wire Company, Sterling. Annual capacity, 36,000 tons of wire for barbed wire, wire nails, bale ties, woven fencing, etc.

Garden City Wire and Spring Company, 50 Chester st., Chicago. Sizes, from No. 000 to No. 22 gauge. Annual capacity, 3,000 tons of wire.

Gilbert and Bennett (The) Manufacturing Company, Blue Island. Chicago office, 153 Lake st. Sizes, from rod down to No. 36 gauge. Annual capacity, 2,000 tons of wire for wire cloth, netting, etc. *See Connecticut.*

Grand Crossing Tack Company, Grand Crossing, Chicago. Annual capacity, 16,200 tons of wire.

Illinois Steel Company, Rookery Building, Chicago. Works at Joliet. Rods. Annual capacity, 200,000 tons.

Joliet Works, Consolidated Barb Wire Company, Joliet. Product, bright, annealed, and galvanized wire. Sizes, from No. 2 to No. 18 gauge. Annual capacity, 25,000 tons. *See Lawrence Works in Kansas.*

Laidlaw (The) Bale Tie Company, Kansas City, Mo. Works at Joliet. Sizes, from No. 0 to No. 22 gauge. Annual capacity, 7,500 tons of wire for bale ties, box straps, wire nails, staples, etc.

Missouri Wire and Nail Company, East St. Louis. Building a plant to draw wire and make wire nails. Sizes, up to No. 18. Annual capacity, 6,000 tons of wire for barbed wire, wire nails, staples, etc.

Waukegan Works, Washburn and Moen Manufacturing Company, Waukegan. Main office, Worcester, Mass.; Chicago office, 160-64 Lake street. Rods and wire. Annual capacity: steel or copper rods, 100,000 tons; wire, 60,000 tons. *See Massachusetts.*

WISCONSIN—2.

Badger (The) Nail Company, Milwaukee. Sizes, from No. 0 to No. 20 gauge inclusive. Annual capacity, 9,000 tons of steel wire.

Cedarburg Wire, Wire Nail, and Screw Company, Cedarburg. Sizes, from No. 2 to No. 21 gauge. Annual capacity, 1,200 tons of nail wire.

MISSOURI—1.

St. Louis Wire Mill, American Steel and Wire Company, Rookery Building, Chicago. Works at St. Louis. Sizes, from No. 0 to No. 20 gauge. Annual capacity, 30,000 tons of wire. *See Pennsylvania, Ohio, Indiana, and Illinois.*

KANSAS—1.

Lawrence Works, Consolidated Barb Wire Company, Lawrence. Product, bright, annealed, and galvanized wire. Sizes, from No. 2 to No. 18 gauge. Annual capacity, 15,000 tons. *See Joliet Works in Illinois.*

WASHINGTON—2.

Puget Sound Wire Nail and Steel Company, Everett. Annual capacity, 15,000 tons of wire.

Townsend Nail Works, The Port Townsend Steel Wire and Nail Company, Port Townsend. Annual capacity, 10,000 tons of wire. Idle and for sale.

CALIFORNIA—1.

Pacific Iron and Nail Company, 132 Market street, San Francisco. Works at Oakland. Product, barbed fence wire and market wire.

UNITED STATES.

Number of works in the United States in April, 1898, which are equipped with machinery for rolling wire rods: 24 completed and 1 projected.

Number of works having wire-drawing plants: 74 completed, 1 building, and 1 projected.

WIRE-NAIL WORKS.

Some of the wire-nail works purchase the wire which they use, but a number of establishments have rod mills and roll rods and draw wire for their own use and for sale. The works which roll rods are fully described in the list of rolling mills and steel works beginning on page 73. The capacity of wire nails is given in kegs of 100 pounds, and has been furnished by the respective manufacturers.

MASSACHUSETTS—6.

Baker (Charles F.) & Co., 50 Lincoln street, Boston. Sizes, 14, 15, 16, and 17 gauges. Number of nail machines, 81. Annual capacity, 12,000 kegs of steel nails.

Gurney, (D. B.,) Whitman. Draws wire and makes wire nails.

Sizes, up to 20-penny inclusive. Number of nail machines, 33. Annual capacity, 50,000 kegs.

Plymouth (The) Mills, Plymouth. Draw wire for their own use and make wire nails.

Taunton Tack Company, branch of the Atlas Tack Company, Taunton. Draws wire and makes wire nails. Sizes, up to 6 inches. Number of nail machines, 60. Annual capacity, 15,000 kegs.

Taunton Wire Nail Company, Taunton. Sizes, from $\frac{1}{8}$ to 8 inches. Number of machines, 30. Annual capacity, 25,000 kegs.

Washburn and Moen Manufacturing Company, Worcester. Rolls rods, draws wire, and makes all sizes and kinds of wire nails. Number of nail machines, 100. Annual capacity, double turn, 120,000 kegs. *See Pacific Works in California.*

RHODE ISLAND—1.

American Screw Company, Providence. Draws wire and makes all sizes of wire nails. Number of nail machines, 51.

CONNECTICUT—1.

Russell and Erwin Manufacturing Company, New Britain. Warehouse, 45 Chambers st., New York City. Makes all sizes of wire nails. Number of nail machines, 37. Annual capacity, 25,000 kegs.

NEW YORK—8.

Griswold, (J. Wool,) Troy. Draws wire and makes wire nails. Sizes, from 3-penny fine to 8-inch spikes. Number of nail machines, 20. Annual capacity, double turn, 40,000 kegs.

Hassall, (John,) 63 Elizabeth street, New York City. Works at Brooklyn. Sizes, from the smallest nail up to 4 inches. Specialty, escutcheon pins, made of brass, copper, and steel. Number of nail machines, 50. Annual capacity, 5,000 kegs.

Igoe Brothers, 470 Driggs avenue, Brooklyn. Draw wire and make wire nails. Sizes, from $\frac{3}{8}$ to 5 inches. Number of nail machines, 25. Annual capacity, 20,000 kegs.

New York Metal Ceiling Company, 614 West Twenty-first st., New York City. Sizes, from 2-penny to 60-penny. Number of nail machines, 9. Annual capacity, 10,000 kegs.

New York Spike and Nail Works, Estate of Adolph Starke, 441-43 East Tenth st., New York City. Sizes, from $\frac{1}{2}$ to 7 inches. Number of nail machines, 5. Daily capacity, 50 kegs. Expect to increase number of nail machines in the near future.

Palatine Wire Company, lessee, 253 Broadway, New York City. Works at Newburgh. Draws wire and makes wire nails of all sizes up to 40-penny. Number of nail machines, 25. Daily capacity, 100 kegs. Titchener (E. H.) & Co., Binghamton. Sizes, 3 inches and smaller. Number of nail machines, 7. Annual capacity, 3,000 kegs.

Twisted (The) Wire Box Strap Company, 451 Greenwich st., New York City. Sizes, from 4-penny to 10-penny. Number of nail machines, 9. Idle.

NEW JERSEY—1.

Roebbling's (John A.) Sons Company, Trenton, Mercer county. Rolls rods, draws wire, and makes all sizes of wire nails. Number of nail machines, 21. Annual capacity, 30,000 kegs.

PENNSYLVANIA—13.

American Steel and Wire Company, general office, Rookery Building, Chicago. Three works: Allentown Works, at Allentown; roll rods, draw wire, and make all sizes of wire nails; number of nail machines, 166; annual capacity, 600,000 kegs. Pittsburgh Works, at Rankin Station, Allegheny county; roll rods, draw wire, and make all sizes of wire nails; number of nail machines, 110; annual capacity, 800,000 kegs. Beaver Falls Works, at Beaver Falls; roll rods, draw wire, and make all sizes of wire nails; number of nail machines, 142; annual capacity, 850,000 kegs. *See Ohio, Indiana, Illinois, and Missouri.*

Beatty (Joseph) & Co., 1002 Penn ave., Pittsburgh. Sizes, 12-penny and smaller. Number of nail machines, 3. Annual capacity, 30,000 kegs. Nail machines idle.

Goff Steel Company Limited, 336 Fourth ave., Pittsburgh. Works at Wilson Station on the Monongahela Division of the Pennsylvania Railroad. Number of nail machines, 4. Daily capacity, about 60 kegs.

Hogan (The) Manufacturing Company, Sixteenth and Cascade sts., Erie. Sizes, from the smallest up to 60-penny. Number of nail machines, 10 double-end. Annual capacity, 75,000 kegs of steel nails.

New Castle Wire Nail Works, Shenango Valley Steel Company, New Castle. Roll rods, draw wire, and make wire nails. Number of nail machines, 300. Annual capacity, 1,250,000 kegs.

Oliver Wire Company, 1001 Muriel st., Pittsburgh. Rolls rods, draws steel wire, and makes steel wire nails. Sizes, from $\frac{1}{4}$ to 9 inches. Number of nail machines, 234. Annual capacity, 960,000 kegs.

Philips, Townsend & Co., North Penn Junction, Philadelphia. Draw wire and make all sizes of wire nails. Number of nail machines, 100. Annual capacity, 200,000 kegs.

Pittsburgh Wire Company, Braddock. Branch office, 232 Fifth ave., Pittsburgh. Rolls rods, draws wire, and makes all sizes of wire nails. Number of nail machines, 102. Annual capacity, 570,000 kegs.

Portage Iron Company Limited, Duncansville, Blair county. New York office, A. R. Whitney & Co., 29 Broadway. Rolls rods, draws wire, and makes wire nails. Sizes, from cigar box nail to 12-inch spike. Number of nail machines, 103. Annual capacity, double turn, 500,000 kegs.

Standard (The) Wire Nail Works, Sunbury. All sizes of steel wire nails. Number of nail machines, 12. Annual capacity, 95,000 kegs. Townsend, (C. C. & E. P.,) New Brighton. Works at Fallston. Draw wire and make wire nails. Sizes, 60-penny and smaller. Number of nail machines, 60. Annual capacity, 150,000 kegs.

MARYLAND—2.

Baltimore Tack Company, 608 Water st., Baltimore. Sizes, from 3-penny to 60-penny. Number of nail machines, 15. Annual capacity, 50,000 kegs.

Clendenin Brothers, 111 South Gay st., Baltimore. Sizes, to 12-penny. Number of nail machines, 9. Annual capacity, 15,000 kegs.

WEST VIRGINIA—1.

Columbia Barb Wire and Nail Works, D. A. Chenoweth, Indianapolis, Ind. Works at Kanawha City. Draw wire and make standard sizes of wire nails. Number of nail machines, 52. Annual capacity, 225,000 kegs. Works now idle, but may be put in operation in 1898.

OHIO—12.

American Steel and Wire Company, general office, Rookery Building, Chicago. Five works: Consolidated Works, at Cleveland; roll rods, draw wire, and make wire nails; sizes, from $\frac{5}{8}$ to 9 inches; number of nail machines, 272; annual capacity, 1,000,000 kegs. American Works, at Cleveland; roll rods, draw wire, and make wire nails; sizes, from 2-penny to 60-penny; number of nail machines, 19; annual capacity, 90,000 kegs. HP Nail Works, at Cleveland; roll rods, draw wire, and make all sizes of wire nails; number of nail machines, 360; annual capacity, 1,500,000 kegs. Findlay Works, at Findlay; draw wire and make wire nails; sizes of nails made, from $\frac{1}{2}$ to 6 inches; number of nail machines, 112; annual capacity, 720,000 kegs. Salem Works, at Salem; draw wire and make wire nails; sizes of nails made, from $\frac{1}{4}$ to 12 inches; number of nail machines, 124; annual capacity, 650,000 kegs. *See Pennsylvania, Indiana, Illinois, and Missouri.*

Cincinnati (The) Barbed Wire Fence Company, Fairmount, Cincinnati. Draws wire and makes all sizes of wire nails. Number of nail machines, 50. Annual capacity, 200,000 kegs.

Cleveland Rolling Mill Company, Western Reserve Building, Cleveland. Rolls rods, draws wire, and makes wire nails. Number of nail machines, 30. Annual capacity, 200,000 kegs.

Drake (W. R.) & Co., Cleveland. Number of nail machines, 1. Idle.

Hollinger (The) Fence Company, Greenville. Number of nail machines, 7. Idle.

Kirk-Latty (The) Manufacturing Company, Cleveland. Makes all sizes of wire nails. Number of nail machines, 20.

New Philadelphia Wire Nail Works, New Philadelphia. Draw wire and make wire nails. Number of nail machines, 60. Annual capacity, 300,000 kegs. Idle.

Schlueter (The) Cycle Company, 64 Plum st., Cincinnati. Number of nail machines, 10. Annual capacity, 40,000 kegs. Nail machines idle.

INDIANA—5.

Alexandria Wire Nail Company, Alexandria. Draws wire for its own use and makes standard sizes of steel wire nails. Number of nail machines, 10. Annual capacity, about 30,000 kegs.

Anderson Works, American Steel and Wire Company, general office, Rookery Building, Chicago. Works at Anderson. Roll rods, draw wire, and make all sizes of wire nails. Number of nail machines, 175. Annual capacity, 840,000 kegs. *See Pennsylvania, Ohio, Illinois, and Missouri.*

Arrow (The) Company, Cincinnati, Ohio. Works at Anderson. All sizes of standard and list nails. Number of nail machines, 75. Annual capacity, 200,000 kegs.

Indiana Wire Fence Company, Crawfordsville. Standard sizes of nails. Number of nail machines, 35. Annual capacity, 100,000 kegs. Also makes barbed wire, woven wire field fencing, fence staples, etc.

Tower (The) Manufacturing Company, Madison. Sizes, up to 30-penny. Number of nail machines, 13. Annual capacity, about 30,000 kegs.

ILLINOIS—17 COMPLETED AND 1 BUILDING.

American Steel and Wire Company, general office, Rookery Building, Chicago. Two works: Joliet Works, at Joliet; draw wire and make standard sizes of wire nails; number of nail machines, 182; annual capacity, 1,250,000 kegs. Ellwood Works, at DeKalb; draw wire and make standard sizes of wire nails; number of nail machines, 130; annual capacity, 600,000 kegs. *See Pennsylvania, Ohio, Indiana, and Missouri.*

Bates Machine Company, Joliet. Standard sizes of wire nails. Number of nail machines, 20. Annual capacity, 200,000 kegs.

Belleville Wire Nail Company, Mueller & Wangelin, Belleville. Sizes, from 2-penny to 10-penny. Number of nail machines, 6. Annual capacity, 15,000 kegs of steel nails.

Continental Wire Company, Laclede Building, St. Louis, Missouri. Works at Granite City, Illinois. Draws wire and makes all sizes of steel wire nails. Number of nail machines, 30. Annual capacity, 180,000 kegs.

Dillon-Griswold Wire Company, Sterling. Draws wire and makes all sizes of wire nails. Number of nail machines, 55. Annual capacity, 150,000 kegs.

Garden City Wire and Spring Company, 50 Chester street, Chicago.

Draws wire and makes wire nails. Sizes, from 2-penny common to 60-penny. Number of nail machines, 6. Annual capacity, 40,000 kegs. Grand Crossing Tack Company, Grand Crossing, Chicago. Draws wire and makes all sizes of wire nails. Number of nail machines, 105. Annual capacity, 360,000 kegs.

Illinois (The) Nail Company, No. 3 Dix st., Chicago.

Joliet Works, Consolidated Barb Wire Company, Joliet. Draw wire and make wire nails. Sizes, from 2-penny to 60-penny. Number of nail machines, 25 double. Annual capacity, 180,000 kegs. *See Lawrence Works in Kansas.*

Kilmer Wire Manufacturing Company, 21 Quincy st., Chicago. Works at Chicago Plains. Sizes, up to 40-penny. Number of nail machines, 8.

Laidlaw (The) Bale Tie Company, Kansas City, Mo. Works at Joliet. Draws wire and makes wire nails. Sizes, from 2-penny fine to 60-penny common. Number of nail machines, 14. Annual capacity, 60,000 kegs.

Lawrence Brothers, Sterling. Sizes, from 2-penny to 40-penny. Number of nail machines, 13. Annual capacity, 25,000 kegs.

Missouri Wire and Nail Company, East St. Louis. Building a plant to draw wire and make wire nails. Sizes, up to 60-penny. Number of nail machines, 20. Annual capacity, about 60,000 kegs.

North Western Barb Wire Company, Sterling. All sizes of wire nails. Number of nail machines, 20. Annual capacity, 36,000 kegs.

Quincy Hardware Manufacturing Company, Quincy. Standard sizes of steel wire nails, from 2-penny to 60-penny. Number of nail machines, 16. Annual capacity, 70,000 kegs.

Stanley (The George W.) Company, Belleville. All sizes of wire nails. Number of nail machines, 42. Annual capacity, 60,000 kegs. Also makes staples.

Thomas (The) Brass and Iron Company, Waukegan. Sizes, from 2-penny to 30-penny inclusive. Number of nail machines, 9. Annual capacity, 62,600 kegs.

MICHIGAN—1.

Empire Wire Nail Company, 258 Cass ave., Detroit. Works at 101 Adams ave. Sizes, $\frac{5}{8}$ and $\frac{3}{4}$ of an inch, made from 18, 19, and 20 gauge wire. Number of nail machines, 15. Annual capacity, 2,000 kegs of steel wire nails. Also makes radiator chaplets.

WISCONSIN—4.

Badger (The) Nail Company, Milwaukee. Draws wire and makes common and special wire nails. Sizes, from the finest to 60-penny inclusive. Number of nail machines, 25. Annual capacity, 150,000 kegs of steel, brass, and copper nails.

Cedarburg Wire, Wire Nail, and Screw Company, Cedarburg. Draws

wire and makes wire nails. Sizes, from $\frac{1}{4}$ to 6 inches. Number of nail machines, 11. Annual capacity, 30,000 kegs.

Janesville Barb Wire Company, Janesville. Sizes, from the smallest up to 60-penny. Number of nail machines, 8. Annual capacity, 50,000 kegs of steel nails.

Milwaukee Tack Company, P. O. Box 166, Milwaukee. Works at Layton Park. Sizes, from $\frac{1}{8}$ to 4 inches. Number of nail machines, 22. Annual capacity, 40,000 kegs.

MISSOURI—1.

St. Louis Wire Mill, American Steel and Wire Company, general office, Rookery Building, Chicago. Works at St. Louis. Draws wire and makes all sizes of wire nails. Number of nail machines, 80. Annual capacity, 400,000 kegs. *See Pennsylvania, Ohio, Indiana, and Illinois.*

KANSAS—1.

Lawrence Works, Consolidated Barb Wire Company, Lawrence. Draw wire and make wire nails. Sizes, from 2-penny fine to 60-penny. Number of nail machines, 20. Annual capacity, 100,000 kegs. *See Joliet Works in Illinois.*

WASHINGTON—2.

Puget Sound Wire Nail and Steel Company, Everett. Draws wire and makes all sizes of steel wire nails from small brads up to spikes 12 inches long. Number of nail machines, 75. Annual capacity, 300,000 kegs.

Townsend Nail Works, The Port Townsend Steel Wire and Nail Company, Port Townsend. Draw wire and make wire nails. Sizes, from $\frac{3}{16}$ to 13 inches. Number of nail machines, 40. Annual capacity, 200,000 kegs. Idle and for sale.

CALIFORNIA—3.

Judson Manufacturing Company, Oakland. Office and salesroom, corner Howard and Beale sts., San Francisco. Number of nail machines, 16. Annual capacity, 35,000 kegs.

Pacific Iron and Nail Company, 132 Market st., San Francisco. Works at Oakland. Draws wire and makes wire nails. Number of nail machines, 22. Annual capacity, 60,000 kegs.

Pacific Works, Washburn and Moen Manufacturing Company, San Francisco. Main office, Worcester, Mass.; San Francisco office, 10 Pine st. Sizes, from 2-penny to 12-inch spikes. Number of nail machines, 32. Annual capacity, 120,000 kegs. *See Massachusetts.*

UNITED STATES.

Total number of wire-nail works in the United States in April, 1898: 79 completed and 1 building.

BRIDGEBUILDING WORKS.

This list does not include contractors or railroad companies which build iron and steel bridges, but only works operating iron and steel bridgebuilding plants. Many of the plants named also erect all kinds of iron and steel buildings. The capacity when given has been furnished by the operators and is in gross tons of 2,240 pounds.

VERMONT—1.

Vermont (The) Construction Company, St. Albans. Railroad and highway bridges. Annual capacity, 2,000 tons.

MASSACHUSETTS—4.

Boston Bridge Works, D. H. Andrews, proprietor, 70 Kilby st., Boston. Works at Cambridge. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 10,000 tons. May build a new plant at Waltham, Mass., in which event the works at Cambridge will be abandoned.

Hawkins (The R. F.) Iron Works, Springfield. Railroad and highway bridges. Annual capacity, 4,000 tons.

New England Structural Company, East Everett. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 7,000 tons.

Springfield Construction Company, Springfield. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 3,000 gross tons. May build new works at Indian Orchard, Mass.

CONNECTICUT—1.

Berlin (The) Iron Bridge Company, East Berlin. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 12,000 tons.

NEW YORK—10.

Buffalo Bridge and Iron Works, Buffalo. Railroad and highway bridges. Annual capacity, 7,500 tons.

Elmira Bridge Company Limited, Elmira. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 30,000 tons.

Groton Bridge and Manufacturing Company, Groton. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 10,000 tons.

- Havana Bridge Works, Montour Falls. Railroad and highway bridges. Annual capacity, 5,000 tons.
- Hilton Bridge Works, Hilton Bridge Construction Company, Commercial Bank Building, Albany. Works at North Albany. Railroad and highway bridges. Annual capacity, 7,500 tons.
- Horseheads Bridge Works, Horseheads Bridge Company, Horseheads. Highway bridges; have erected a few railroad bridges. Annual capacity, 3,500 tons.
- Lane Bridge Works, (not incorporated,) D. F. Lane, proprietor, Painted Post, Steuben county. Highway bridges. Also erect iron and steel buildings.
- Owego Bridge Company, Owego. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 8,000 tons.
- Post & McCord, 289 Fourth ave., New York. Works at Greenpoint, Long Island. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 15,000 tons.
- Rochester Bridge and Iron Works, John F. Alden, proprietor, Rochester. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 12,000 tons.

NEW JERSEY—3.

- Passaic Rolling Mills and Bridge Works, The Passaic Rolling Mill Company, Paterson. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 24,000 tons.
- Roebling's (John A.) Sons Company, Trenton. Suspension bridges.
- Trenton Iron Works, New Jersey Steel and Iron Company, Trenton, Mercer county. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 30,000 tons.

PENNSYLVANIA—16.

- Allentown (The) Rolling Mills, Allentown. Highway bridges only. Also erect iron and steel buildings. Annual capacity, 3,000 tons.
- Dauphin Bridge and Construction Company, 419 Walnut st., Philadelphia. Works at Dauphin. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 6,000 tons.
- Fort Pitt Bridge Works of Pittsburgh, 401 Germania Bank Building, Pittsburgh. Works at South Canonsburg. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 12,000 tons.
- Keystone Bridge Works, The Carnegie Steel Company, Limited, Carnegie Building, Pittsburgh. Works on Fifty-first st. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 50,000 tons. (Formerly owned by the Keystone Bridge Company.)
- Keystone Structural Company, 510 Harrison Building, Philadelphia.

- Works at Royersford. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 6,000 tons.
- Pencoyd Iron Works, (Bridge and Construction Department,) A. and P. Roberts Company, 261 South Fourth st., Philadelphia. Works in Montgomery county, opposite Manayunk. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 50,000 tons.
- Penn Bridge Works, Penn Bridge Company, Beaver Falls. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 5,000 tons.
- Pennsylvania (The) Steel Company, (Bridge and Construction Department,) Girard Building, Philadelphia. Works at Steelton. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, from 25,000 to 30,000 tons.
- Philadelphia Bridge Works, C. R. Baird & Co., Bullitt Building, Philadelphia. Works at Pottstown, Montgomery county. Railroad and highway bridges. Annual capacity, from 18,000 to 20,000 tons. Idle and for sale or lease.
- Phoenix Bridge Works, The Phoenix Bridge Company, 410 Walnut st., Philadelphia. Works at Phoenixville, Chester county. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 50,000 tons.
- Pittsburgh (The) Bridge Works, The Pittsburgh Bridge Company, Thirty-eighth st. and A. V. Ry., Pittsburgh. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 10,000 tons.
- Pottsville Bridge Works, Pottsville Iron and Steel Company, Pottsville. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 7,500 tons.
- Schultz Bridge Iron Company, P. O. Box 1,028, Pittsburgh. Works at McKees Rocks. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 10,000 tons.
- Schuylkill Bridge Works, John Denithorne, Son & Co., Phoenixville. Highway bridges. Also erect iron and steel buildings. Annual capacity, from 500 to 1,000 tons.
- Shiffler Bridge Works, Shiffler Bridge Company, Forty-eighth st. and A. V. Ry., Pittsburgh. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 15,000 tons.
- Union Bridge Company, Athens. New York office, 1 Broadway. Railroad bridges only. Annual capacity, 25,000 tons.

DELAWARE—1.

- Edge Moor Bridge Works, Wilmington. Works at Edge Moor. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 40,000 tons.

MARYLAND—2.

Maryland Steel Company, Girard Building, Philadelphia. Works at Sparrow's Point. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 10,000 tons.

Structural (The) Iron Company, Bush st. and Baltimore and Ohio Railroad, Baltimore. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 5,000 tons.

VIRGINIA—1.

Virginia Bridge and Iron Company, Roanoke. Southern office, Chattanooga, Tenn. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 4,000 tons.

WEST VIRGINIA—1.

West Virginia Bridge Works, Vulcan Road Machine Company, Charlestown. Highway bridges and a few railroad bridges. Also erect iron and steel buildings. Annual capacity, 1,200 tons.

KENTUCKY—1.

Louisville Bridge and Iron Company, cor. Oldham and Eleventh sts., Louisville. Railroad and highway bridges. Annual capacity, 7,500 tons.

TENNESSEE—1.

Converse Bridge Company, Chattanooga. Highway bridges. Also erects iron and steel buildings. Annual capacity, about 1,000 tons.

ALABAMA—2.

Alabama Bridge and Boiler Works, Birmingham. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 1,500 tons.

Southern Bridge Company, Birmingham. Works at Avondale, Jefferson county. Highway bridges and a few railroad bridges. Also erects iron and steel buildings. Annual capacity, 1,000 tons.

TEXAS—1.

Southwestern Bridge and Iron Company, Fort Worth, Tarrant county. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 2,000 tons of bridge work.

OHIO—17.

Bellefontaine (The) Bridge and Iron Company, Bellefontaine. Works at South Bellefontaine. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 5,000 tons.

Brackett (The) Bridge Company, Atlas Bank Building, Cincinnati.

- Works at Glendale. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 10,000 tons.
- Canton (The) Bridge Company, Canton. Railroad and highway bridges. Annual capacity, 3,500 tons.
- Champion (The) Bridge Works, The Champion Bridge Company, Wilmington. Highway bridges only. Also erect iron and steel buildings. Annual capacity, 3,000 tons.
- Champion (The) Iron Company, Kenton. Highway bridges only. Also makes ornamental iron work and material for prison work.
- Iron (The) Substructure Company, 82-88 Wesley Block, Columbus. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 5,000 tons.
- King (The) Bridge Works, The King Bridge Company, Cleveland. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 20,000 tons.
- Massillon (The) Iron Bridge Company, Massillon. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 8,000 tons.
- New Columbus (The) Bridge Company, Columbus, Franklin county. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 750 tons.
- Oregonia (The) Bridge Company, Oregonia, Warren county. Highway bridges. Also occasionally erects iron and steel buildings. Annual capacity, 2,000 tons.
- Portsmouth (The) Structural Steel and Iron Company, Portsmouth. Highway bridges. Also erects iron and steel buildings.
- Rogers (The) Iron Company, Springfield. Highway bridges. Also erects iron and steel buildings.
- Schreiber (The L.) and Sons Company, 623 Eggleston ave., Cincinnati. Railroad and highway bridges. Specialty, iron and steel buildings.
- Toledo (The) Bridge Company, Toledo. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 10,000 tons.
- Variety (The) Iron Works Company, Cleveland. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 7,500 tons.
- Wrought Iron Bridge Company, Canton. Works at South Canton. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 10,000 tons.
- Youngstown (The) Bridge Company, Youngstown. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 10,000 tons.

INDIANA—5.

- Indiana Bridge Company, Muncie, Delaware county. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 10,000 tons.

Indianapolis Bridge and Iron Works, J. D. Adams & Co., 30 Jackson Place, Indianapolis. Works at 598-606 Kentucky ave. Highway bridges. Also erect iron and steel buildings. Annual capacity, 6,000 tons.

Lafayette (The) Bridge Company, Lafayette. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 5,000 tons.

Terre Haute Bridge Company, Eleventh and Sycamore streets, Terre Haute, Vigo county. Highway bridges only. Annual capacity, 5,000 tons.

Wabash Bridge and Iron Works, Wabash. Railroad and highway bridges.

ILLINOIS—6.

American Bridge Works, Fortieth st. and Stewart ave., Chicago. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 30,000 tons.

Chicago Bridge and Iron Company, One-hundred-and-fifth and Throop sts., Chicago. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 10,000 tons.

Joliet Bridge and Iron Company, Joliet, Will county. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 5,000 tons.

Kenwood Bridge Company, 617 First National Bank Building, Chicago. Works at Seventy-seventh st. and Anthony ave. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 6,500 tons.

Lassig Bridge and Iron Works, 707 Rookery Building, Chicago. Works, corner Clybourn and Wrightwood avenues. Railroad bridges only. Also erect iron and steel buildings. Annual capacity, 25,000 tons.

Universal Construction Company, (incorporated,) Rookery Building, Chicago. Works at North Chicago. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 12,000 tons.

MICHIGAN—1.

Detroit Bridge and Iron Works, Detroit. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 12,000 tons.

WISCONSIN—2.

Milwaukee Bridge and Iron Works, The J. G. Wagner Company, Seventeenth st. and St. Paul ave., Milwaukee. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, 8,000 tons.

Wisconsin Bridge and Iron Company, 706 Pabst Building, Milwaukee. Works at North Milwaukee, Milwaukee county. Railroad and high-

way bridges. Also erects iron and steel buildings. Annual capacity, 10,000 tons.

MINNESOTA—1.

Gillette-Herzog (The) Manufacturing Company, 259 First avenue south, Minneapolis. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 10,000 tons.

IOWA—3.

Clinton Bridge and Iron Works, Clinton. Railroad and highway bridges. Also erect iron and steel buildings. Annual capacity, from 5,000 to 6,000 tons.

Fair-Williams Bridge and Manufacturing Company, Ottumwa. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 2,000 tons.

Marshalltown Bridge and Boiler Shops, A. E. Shorthill, proprietor, Marshalltown. Highway bridges. Also erect iron and steel buildings.

MISSOURI—3.

Koken Iron Works, Manchester road and Missouri Pacific R. R., St. Louis. Railroad and highway bridges. Annual capacity, 2,000 tons.

St. Joseph Bridge and Iron Company, St. Joseph. Railroad and highway bridges. Annual capacity, 1,800 tons.

Stupp Brothers Bridge and Iron Company, Seventh and Shenandoah sts., St. Louis. Highway bridges a specialty. Also erects railroad bridges and iron and steel buildings in a small way. Annual capacity, 4,000 tons.

KANSAS—1.

Missouri Valley Bridge and Iron Works, Leavenworth. Railroad and highway bridges. Annual capacity, 12,000 tons.

CALIFORNIA—3.

Judson Manufacturing Company, office and salesroom, corner Howard and Beale sts., San Francisco. Works at Oakland. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 6,000 tons.

Pacific (The) Rolling Mill Company, Mission and First sts., San Francisco. P. O. Box 2,032. Works at Potrero, San Francisco. Railroad and highway bridges. Also erects iron and steel buildings. Annual capacity, 6,000 tons.

Phelps (The) Manufacturing Company, 15 Drumm st., San Francisco. Works at Black Point. Idle for several years.

UNITED STATES.

Total number of bridgebuilding works in the United States in April, 1898: 87.

IRON AND STEEL SHIPBUILDERS.

Below will be found a list of the builders of iron and steel naval, steam, sailing, and other vessels. Some of the yards named also build wooden vessels and iron and steel yachts, tugs, hulls, barges, etc.

MAINE—2.

Bath Iron Works, Limited, Bath. Iron, steel, and composite naval vessels, passenger steamers, yachts, etc.
Sewall (Arthur) & Co., Bath. Sailing vessels.

MASSACHUSETTS—2.

Atlantic (The) Works, East Boston. All kinds of vessels up to 300 feet in length.
Lawley and Son (George) Corporation, South Boston, Suffolk county. Steam and sailing yachts of all kinds.

RHODE ISLAND—1.

Herreshoff Manufacturing Company, Bristol. Torpedo boats and steam and sailing yachts of steel and wood.

NEW YORK—4.

Continental (The) Iron Works, Brooklyn. Ferry-boats and steam vessels.
Gas Engine and Power Company and Charles L. Seabury & Co., Consolidated, Morris Heights, New York City. Iron and steel vessels.
Marvel (T. S.) & Co., Newburgh. All kinds of steam vessels.
Union (The) Dry Dock Company, Buffalo. All kinds of vessels.

NEW JERSEY—3.

Crescent (The) Ship Yard, Lewis Nixon, lessee, Elizabethport. Steel vessels only.
Dialogue (John H.) & Son, Camden. Cruisers, merchant steamers, sailing vessels, yachts, tugs, etc.
Ramsay, (Hugh,) Perth Amboy. All kinds of iron, steel, and wooden vessels.

PENNSYLVANIA—7.

Cramps' Ship Yard, The William Cramp and Sons Ship and Engine Building Company, Beach and Ball sts., Philadelphia. Steel steamships, men-of-war, yachts, etc.
Delaware River Iron Ship Building and Engine Works, Chester. Steel steam vessels of all kinds.

Duquesne Engine and Boiler Works, James Rees and Sons Company, Duquesne Way and Fourth st., Pittsburgh. Iron and wooden light draft side and stern-wheel boats, tugs, launches, barges, lighters, etc. Hillman (The Charles) Ship and Engine Building Company, Beach st. above Palmer st., Philadelphia. All kinds of vessels.

Penn Works, The Neafie and Levy Ship and Engine Building Company, Philadelphia. All kinds of vessels.

Riter Conley Company, 55-56 Water st., Pittsburgh. New York office, 39-41 Cortlandt st. Steel barges, hulls, etc.

Schultz Bridge Iron Company, P. O. Box 1,028, Pittsburgh. Works at McKees Rocks. Steel barges, tow-boat hulls, etc.

DELAWARE—2.

Harlan and Hollingsworth (The) Company, Wilmington. Yards on the Christiana river. All kinds of steam vessels.

Pusey and Jones (The) Company, Wilmington, New Castle county. Yards at the foot of Poplar st. All kinds of vessels.

MARYLAND—3.

Columbian Iron Works, The Columbian Iron Works and Dry Dock Company, Baltimore. Yards at Locust Point. All kinds of vessels.

Maryland Steel Company, Girard Building, Philadelphia. Works at Sparrow's Point. All kinds of steam and sailing vessels and barges.

Reeder (The Charles) and Sons Shipbuilding Company, Baltimore. Small vessels.

VIRGINIA—1.

Newport News (The) Shipbuilding and Dry Dock Company, Newport News. Main office, 1 Broadway, New York City. All kinds of vessels.

LOUISIANA—1.

Damonte Brothers Company, Audubon and Magazine sts., New Orleans. Iron and steel tugs and yachts.

OHIO—3.

Cleveland (The) Ship Building Company, 120 Viaduct, Cleveland. Yards at Lorain. All kinds of lake vessels and steamers.

Craig Ship Building Company, Toledo. Yards at East Toledo. All kinds of vessels and steamers.

Globe (The) Iron Works Company, West Centre and Spruce sts., Cleveland. Passenger and freight steamships, barges, yachts, tugs, light-house tenders, revenue cutters, etc.

INDIANA—1.

Howard's Ship Yard, Edward J. Howard, proprietor, Jeffersonville. Principally river steamers and barges.

ILLINOIS—1.

Chicago Ship Building Company, 925 Rookery Building, Chicago.
Yards at South Chicago. All kinds of vessels.

MICHIGAN—4.

Detroit Dry Dock Company and Dry Dock Engine Works, Detroit.
Yards at Detroit and Wyandotte. Steel and wooden lake vessels and steamers.

Jenks (The) Shipbuilding Company, Port Huron. All kinds of vessels.
Wheeler (F. W.) & Co., West Bay City. All kinds of metallic vessels.

WISCONSIN—3.

American Steel Barge Works, American Steel Barge Company, West Superior. Principal office, 36 Wall st., New York City. All kinds of vessels; whalebacks principally. *See Washington.*

Milwaukee Dry Dock Co., Milwaukee. Iron, steel, and wooden vessels.

Racine Boat Manufacturing Company, Racine. Yachts, tugs, etc., up to 200 feet in length. High-speed yachts a specialty.

IOWA—1.

Iowa Iron Works, Iowa Iron Works Limited, Dubuque. All kinds of vessels not exceeding 8 feet draft; torpedo boats, revenue cutters, etc. Specialties, river steamers and pleasure boats.

WASHINGTON—3.

American Steel Barge Works, American Steel Barge Company, 36 Wall st., New York City. Yards at Everett. Whalebacks principally, but are equipped for building all kinds of vessels. *See Wisconsin.*

McLane, (Sydney H.,) Ballard. Yachts, and tow, freight, and passenger vessels up to 400 tons.

Moran Brothers Company, Seattle. All kinds of vessels, including torpedo boats, etc.

OREGON—1.

Wolff and Zwicker Iron Works, Portland. Torpedo boats, light ships, passenger steamers, and other iron and steel vessels.

CALIFORNIA—1.

Union Iron Works, 222 Market st., San Francisco. Yards at Potrero. Battle-ships, steamships, steam tugs, etc.

UNITED STATES.

Total number of iron and steel ship yards in the United States in April, 1898: 44.

HORSE-NAIL WORKS.

The capacity of the works named below is given in net tons of 2,000 pounds and has been furnished by the respective manufacturers.

MASSACHUSETTS—1.

Putnam (The) Nail Company, Neponset, Boston. Sizes, from No. 1 to No. 14. Number of machines, 100 forging and 120 hammer pointing. Annual capacity, 2,000 net tons.

VERMONT—1.

National Horse Nail Company, Vergennes. Office, 10 Warren street, New York City. Sizes, from No. 2 to No. 12 inclusive. Brand, "Champlain."

CONNECTICUT—3.

Capewell (The) Horse Nail Company, 40 Governor st., Hartford. All sizes. Brand, "Capewell."

Eagle (The) Bicycle Manufacturing Company, Torrington. "New Process Nails."

Fowler (The) Nail Company, Seymour. Sizes, Nos. 3, 4, 4½, 5, 6, 7, 8, 9, and 10. Brand, "Vulcan."

NEW YORK—3.

Ausable Horse Nail Company, 10 Murray st., New York City. Works at Keeseville. Sizes, from No. 1 to No. 12 inclusive. Number of machines, 42 forging and 22 hammer pointing. Annual capacity, 1,000 net tons.

Essex Horse Nail Company Limited, Essex. Sizes, from No. 1 to No. 13. Number of machines, 20 forging and 12 hammer pointing. Annual capacity, 500 net tons. Brands, "Essex," "Snowden," and "Lyra."

Mooney (W. M.) & Co., Ausable Chasm. Sizes, from No. 1 to No. 12 inclusive, in both large and small heads.

PENNSYLVANIA—1.

Standard Horse Nail Company, New Brighton. Sizes, from No. 3 to No. 12 inclusive. Brand, "Standard."

ILLINOIS—3.

Kankakee Superior Horse Nail Company, Kankakee. Sizes, from No. 2 to No. 11 inclusive. Number of machines, 12 Dodge forging and

8 Woodford pointing. Annual capacity, 275 net tons. Brand, "Superior." May be removed to Louisville, Ky.

North-Western (The) Horse Nail Manufacturing Company, 51-53 Franklin st., Chicago. Works at Brighton Park, Chicago. Sizes, from No. 2 to No. 11, in both large and small heads. Number of machines, 75 forging and 27 pointing. Annual capacity, 2,200 net tons.

Union Horse Nail Company, 603 West Twenty-second st., Chicago. Sizes, from No. 3 to No. 10 inclusive.

UNITED STATES.

Number of horse-nail works in the United States in April, 1898: 12.

LOCOMOTIVE WORKS.

The following list does not include railroad companies which build locomotives. Unless otherwise stated the works named build freight and passenger locomotives; some also build electric locomotives.

MAINE—1.

Portland Company, Portland. Steam locomotives. Annual capacity, 50.

NEW HAMPSHIRE—1.

Manchester Locomotive Works, Manchester. All kinds of standard gauge steam locomotives. Annual capacity, 125.

MASSACHUSETTS—1.

General Electric Company, Schenectady, New York. Works at Lynn, Essex county, Massachusetts. Electric locomotives from 2 to 100 tons. Annual capacity, from 200 to 300. *See New York.*

RHODE ISLAND—1.

Rhode Island Locomotive Works, Providence. Standard and narrow-gauge steam locomotives. Annual capacity, 250.

NEW YORK—5.

Brooks Locomotive Works, Dunkirk. All kinds of steam locomotives. Annual capacity, 400.

Dunkirk Engineering Company, Henry Reynolds, assignee, Dunkirk. Geared locomotives from 7 to 50 tons' weight. Annual capacity, 25. Idle and for sale.

General Electric Company, Schenectady. Electric locomotives from 2 to 100 tons. Annual capacity, from 200 to 300. *See Massachusetts.*

Hunt (C. W.) Company, 45 Broadway, New York City. Works at West New Brighton. Electric narrow-gauge locomotives for industrial railways and mines.

Schenectady Locomotive Works, Schenectady, Schenectady county. All kinds of locomotives, including electric. Annual capacity, 450.

NEW JERSEY—2.

Cooke Locomotive and Machine Company, Paterson. Simple and compound locomotives. Annual capacity, 250.

Rogers Locomotive Company, Paterson, Passaic county. All kinds of steam locomotives. Annual capacity, 300.

PENNSYLVANIA—6.

Baldwin Locomotive Works, Burnham, Williams & Co., 500 North Broad st., Philadelphia. All kinds of steam, compressed air, and electric locomotives. Annual capacity, 1,000.

Climax Works, Climax Manufacturing Company, Corry. Patent geared steam locomotives for steep grades and sharp curves. Annual capacity, 50.

Dickson Manufacturing Company, Scranton. Standard and special steam locomotives. Annual capacity, 150.

Pittsburgh Locomotive and Car Works, 396 Beaver ave., Allegheny. All kinds of steam locomotives; also prepared to build electric locomotives. Annual capacity, from 250 to 300.

Porter (H. K.) & Co., 541 Wood st., Pittsburgh. Works at Fortyninth st. and A. V. Ry. Light steam, electric, and compressed air locomotives from 3 to 45 tons; also street and compressed air motors. Annual capacity, 300.

Vulcan Iron Works, Wilkesbarre, Luzerne county. Narrow-gauge steam locomotives. Annual capacity, from 40 to 50.

MARYLAND—1.

Ryan and Macdonald Manufacturing Company, 44 South st., Baltimore. Works at Curtis Bay, Baltimore. Narrow-gauge locomotives under 20 tons.

VIRGINIA—2.

Richmond Locomotive and Machine Works, Richmond. All kinds of steam locomotives. Annual capacity, 150.

Virginia Iron Works, T. W. Godwin & Co., Norfolk, Norfolk county. Narrow-gauge steam locomotives. Annual capacity, 50.

ALABAMA—1.

Hood Machine Company, J. A. Hood, proprietor, Birmingham. Electric locomotives. Annual capacity, about 20.

OHIO—1.

Lima (The) Locomotive and Machine Company, Lima. All kinds of locomotives. Annual capacity, about 150.

ILLINOIS—1.

Grant Locomotive Works, Siemens and Halske Electric Company of America, owners, 98 Jackson street, Chicago. Works at West Twelfth street and Robinson avenue. All kinds of steam and electric locomotives. Annual capacity, 100.

CALIFORNIA—1.

Risdon (The) Iron and Locomotive Works, Howard and Beale streets, San Francisco. Special logging and electric locomotives.

UNITED STATES.

Total number of locomotive works in the United States in April, 1898: 24.

MALLEABLE IRON WORKS.

The daily capacity of each works, when given, is in gross tons of 2,240 pounds, and has been furnished by the manufacturers.

NEW HAMPSHIRE—1.

Laconia (The) Car Company Works, 50 State street, Boston, Massachusetts. Works at Laconia. Four annealing furnaces. Product, all kinds of castings. Daily capacity, 6 tons.

MASSACHUSETTS—3.

Arcade Malleable Iron Company, Worcester. Six annealing furnaces. Product, all kinds of castings to order. Daily capacity, from 3 to 4 tons.

Belcher Malleable Iron Works, Belcher Malleable Iron Company, Easton. Two annealing furnaces. Product, machinery and electrical castings of every description; also castings for fire-arms, elevators, agricultural implements, bicycles, etc. Daily capacity, 1½ tons.

Worcester Malleable Iron Works, Worcester. Three annealing furnaces. Product, all kinds of castings to order. Daily capacity, 3 tons.

RHODE ISLAND—1.

Rhode Island Malleable Iron Works, Hills Grove. Four annealing furnaces. Product, light castings. Specialty, castings for boilers. Daily capacity, 1 ton.

CONNECTICUT—9.

- Bridgeport (The) Malleable Iron Company, Bridgeport. Eighteen annealing furnaces. Product, anything required from patterns furnished. Daily capacity, $1\frac{1}{4}$ tons per furnace.
- Fitch (The W. and E. T.) Company, 151 East st., New Haven. Four annealing furnaces. Product, saddlery hardware and other light castings chiefly consumed in its own works; also small castings to order. Daily capacity, 2 tons.
- Malleable Iron Fittings Company, Branford. Seventeen annealing furnaces. Product, steam and gas pipe fittings, railroad and carriage work, and refined castings of every description; also open-hearth steel and semi-steel castings for machinery, bicycles, gun-work, etc. Daily capacity, 20 tons.
- Malleable Iron Works, New Britain, Hartford county. Product, castings to order.
- Mount Carmel Malleable Iron Works, Walter W. Woodruff & Sons, Mount Carmel. Four annealing furnaces. Product, carriage parts and miscellaneous castings. Daily capacity, 2 tons.
- Naugatuck Malleable Iron Company, Naugatuck. Works at Union City. Thirteen annealing furnaces. Product, all kinds of castings. Daily capacity, 25 tons.
- North and Judd (The) Manufacturing Company, New Britain, Hartford county. Nine annealing furnaces. Product, light and medium castings of every description consumed in its own factory. Daily capacity, 4 tons.
- Terry (The Andrew) Company, Pequabuck. Works near Terryville Station. Eight annealing furnaces. Product, light castings, clock keys, and blind hinges. Daily capacity, 5 tons.
- Vulcan Iron Works, New Britain, Hartford county. Four annealing furnaces. Product, custom work of all kinds. Daily capacity, $2\frac{1}{2}$ tons per furnace.

NEW YORK—15.

- Acme Malleable Iron Works, E. G. Felthousen, proprietor, 245 Military Road, Buffalo. Product, castings of all kinds.
- Albany Malleable Iron Works, Page & Sill, proprietors, Albany. Four annealing furnaces. Product, all kinds of railroad castings. Daily capacity, 5 tons.
- Buffalo Malleable Iron and Steel Works, Pratt and Letchworth Company, 189 Tonawanda st., Buffalo. Product, steam and electric railway and general heavy castings.
- Deposit Iron Company Limited, Deposit. Three annealing furnaces. Product, saddlery hardware and general castings.
- Frazer and Jones Company, Syracuse. Product, saddlery hardware and general castings.

- Gould Coupler Company, 66 Broadway, New York City. Works at Depew. Twelve annealing furnaces. Product, car couplers and railroad castings. Daily capacity, 80 tons.
- Johnson (Isaac G.) & Co., Spuyten Duyvil, New York. Nine annealing furnaces. Product, all kinds of castings. Daily capacity, 18 tons.
- Lancaster Malleable Iron Works, Lancaster. Product, castings for steam and street railway purposes.
- Oriskany Malleable Iron Company, Oriskany. Three annealing furnaces. Product, light and heavy castings for custom work. Daily capacity, $4\frac{1}{2}$ tons.
- Osborne (D. M.) & Co., Auburn. Ten annealing furnaces. Product, castings for agricultural machinery. Daily capacity, 10 tons.
- Syracuse Malleable Iron Works, Syracuse. Product, car couplers and other castings.
- Torrance Iron Company, Troy. Works on Green Island. Product, carriage, stove, and special castings.
- Troy Malleable Iron Company, Troy. Product, general and railroad castings.
- Westmoreland Malleable Iron Works, Westmoreland Malleable Iron Company Limited, Westmoreland. Three annealing furnaces. Product, agricultural, saddlery, carriage, trap, hame, and other castings to order. Daily capacity, 3 tons.
- Wood (Walter A.) Mowing and Reaping Machine Works, Hoosick Falls. Seven annealing furnaces. Product, castings for its own use and for all kinds of custom work. Daily capacity, 18 tons.

NEW JERSEY—5.

- Ballard, (George M.), 51 Johnson st., Newark, Essex county. One annealing furnace. Product, small miscellaneous castings. Daily capacity, $\frac{1}{2}$ ton.
- Barnett, (Estate of Oscar,) Newark. Product, custom work principally.
- Meeker, (S. J.), 95 Clay st., Newark. Four annealing furnaces. Product, all kinds of castings from $\frac{1}{4}$ of an ounce to 200 lbs. Daily capacity, 6 tons.
- Morris & Barlow, 28 Orange st., Newark. Two annealing furnaces. Product, light castings. Daily capacity, 2 tons. Also make gray iron castings.
- Trenton (The) Malleable Iron Company, Trenton, Mercer county. Three annealing furnaces. Product, large and small castings for special and general work. Daily capacity, $5\frac{1}{2}$ tons.

PENNSYLVANIA—11.

- American Malleable Iron Works, Latrobe. Owned by Milton I. Baird, 309 Ferguson Building, Pittsburgh. Four annealing furnaces. Idle and for sale.

- Erie Malleable Iron Works, Erie Malleable Iron Company Limited, corner Twelfth and Cherry sts., Erie. Product, all kinds of castings. Annual capacity, 6,500 tons.
- Flagg (Stanley G.) & Co., Nineteenth st. and Pennsylvania ave., Philadelphia. Two works. Union Works, at Philadelphia; 5 annealing furnaces; product, miscellaneous castings for machinery, hardware, and pipe fittings; daily capacity, 7 tons. Pottstown Works, at Pottstown; 4 annealing furnaces; product, iron pipe fittings, etc.; daily capacity, 8 tons.
- Jarecki Manufacturing Company, Erie. Six annealing furnaces. Product, iron pipe fittings, etc. Daily capacity, 15 tons.
- Laird Malleable Iron Company, Huntingdon, Huntingdon county. Two annealing furnaces. Product, small castings for its own use. Daily capacity, $1\frac{1}{2}$ tons.
- McConway and Torley (The) Company, Pittsburgh. Product, principally car couplers.
- National Hardware and Malleable Iron Works, Thomas Devlin & Co., Third st. and Lehigh ave., Philadelphia. Five annealing furnaces. Product, carriage hardware, saddlery, wagon, malleable fittings, and tinsmith, trunk, agricultural, and miscellaneous castings. Daily capacity, 10 tons. Also make gray iron castings and hardware.
- Philadelphia Hardware and Malleable Iron Works, Incorporated, Eighth and Jefferson sts., Philadelphia.
- Pittsburgh Malleable Iron Company, Thirty-fourth and Smallman sts., Pittsburgh. Product, air-brake fittings, electric motor gears, gear cases, and miscellaneous castings. Daily capacity, 25 tons.
- Union Malleable Iron Works, Allegheny. Four annealing furnaces. Product, small castings. Daily capacity, 2 tons. Idle.

DELAWARE—1.

- Wilmington Malleable Iron Company, Wilmington, New Castle county. Six annealing furnaces. Product, agricultural implement, railroad, and other castings. Daily capacity, 25 tons.

MARYLAND—1.

- Baltimore Malleable Iron and Steel Casting Company, Charles and Wells sts., Baltimore. Three annealing furnaces. Product, railroad, machinery, and other castings. Daily capacity, 10 tons. Also makes gray iron and air furnace castings.

TENNESSEE—1.

- Southern Malleable Iron Works, Ross-Mehan Foundry Company, Chattanooga. Ten annealing furnaces. Product, railroad castings, couplers, plow castings, patented articles, etc. Daily capacity, from 12 to 15 tons. Also make gray iron castings.

OHIO—13.

- Buckeye (The) Malleable Iron and Coupler Company, Columbus. Works at east end of Russell street. Twenty-two annealing furnaces. Product, car couplers, car-coupler knuckles, chain links, scissors, etc. Daily capacity, 60 tons.
- Canton Malleable Iron Company, Canton. Three annealing furnaces. Product, saddlery hardware and all kinds of patented articles. Daily capacity, 6 tons.
- Dayton (The) Malleable Iron Company, West Third st., Dayton. Works at West Dayton. Product, railroad, car, agricultural, carriage, wheel flange, and general castings to order.
- Eberhard (The) Manufacturing Company, Cleveland, Cuyahoga county. Product, saddlery, carriage, wagon hardware, and patented specialties.
- Elbel & Co., Canton. Four annealing furnaces. Product, saddlery hardware castings. Daily capacity, $4\frac{1}{2}$ tons.
- Haven (The James L.) Company, 68 Plum st., Cincinnati. Six annealing furnaces and one air furnace. Product, carriage and job work. Daily capacity, 5 tons.
- Marion Malleable Iron Company, Marion. Four annealing furnaces. Product, general castings. Daily capacity, 4 tons.
- National (The) Malleable Castings Company, Cleveland. Two works: One at Cleveland and one at Toledo. Product, general castings to order. *See Indiana and Illinois.*
- Springfield Malleable Iron Company, Springfield. Works at George street and C, C, C., and St. L. Railway. Product, general castings to order.
- Warder, (The) Bushnell, and Glessner Company, Springfield. Sixteen annealing furnaces. Product, castings for "Champion" binders, mowers, and reapers only. Daily capacity, $13\frac{1}{2}$ tons.
- Whiteley Malleable Iron Works, Whiteley Malleable Iron Company, Springfield. Sixteen annealing furnaces. Product, all kinds of agricultural implement, carriage, and car work, including patent couplers. Daily capacity, 30 tons.
- Youngstown Casting Company, Youngstown. Makes gray iron castings only, but is also equipped for the manufacture of malleable castings.

INDIANA—4.

- Indianapolis Malleable Iron Works, The National Malleable Castings Company, Indianapolis. General office, Cleveland, Ohio. Works at Indianapolis, Ind. Product, general castings to order. *See Ohio and Illinois.*
- Oliver Chilled Plow Works, South Bend Iron Works, proprietors, South Bend. Four annealing furnaces. Product, small castings for plows. Daily capacity, 3 tons.

Sweet and Clark (The) Company, J. C. Tibbitts, Receiver, Marion. Nine annealing furnaces. Product, general castings. Monthly capacity, 225 tons.

Whiteley Malleable Castings Company, Muncie. Sixteen annealing furnaces. Product, agricultural implement and railroad castings; also manufacturers of "St. Louis," "Heim," "Washburn," "Williams," "National," and "America" car couplers. Daily capacity, 50 tons.

ILLINOIS—11 COMPLETED AND 1 BUILDING.

Chicago Malleable Iron Works, The National Malleable Castings Company, Chicago. General office, Cleveland, Ohio. Product, general castings to order. *See Ohio and Indiana.*

Crane Company, 10 North Jefferson st., Chicago. Works at 52 Judd st. Ten annealing furnaces. Product, fittings, die stocks, pipe vises, etc. Daily capacity, 25 tons.

Decatur Malleable Iron Works, Decatur. Two annealing furnaces. Product, agricultural implement and general castings. Daily capacity, 25 tons.

Deering Harvester Company, 16 Fullerton ave., Chicago. Works on Clybourn ave. Fourteen annealing furnaces. Product, agricultural implement castings, all consumed by the company.

Illinois Malleable Iron Company, 30-32 West Monroe st., Chicago. Works at 515 Diversey ave. Six annealing furnaces. Product, pipe fittings and general castings. Daily capacity, 6 tons. Also makes gray iron and brass castings to order.

Missouri Car and Foundry Company, Houser Building, St. Louis, Mo. Works at Madison. Eight annealing furnaces. Product, railroad work. Daily capacity, 35 tons.

Missouri Malleable Iron Works, Missouri Malleable Iron Company, East St. Louis. Eighteen annealing furnaces. Product, implement, carriage, railroad, street car, range, and other castings. Daily capacity, 50 tons.

Moline Malleable Iron Company, St. Charles, Kane county. Product, link belting and general castings to order.

Parlin and Orendorff Company, Canton. Building works for the manufacture of malleable castings.

Rockford Malleable Iron Works, Rockford. Six annealing furnaces. Product, castings for agricultural implements chiefly; also for general purposes. Daily capacity, from 10 to 12 tons.

Union Malleable Iron Company, Moline. Seven annealing furnaces. Product, agricultural implement, car, carriage, and other castings. Daily capacity, 15 tons.

Western Tube Company, (formerly Haxtun Steam Heater Company,) Kewanee. Five annealing furnaces. Product, gas, water, and steam fittings. Daily capacity, 5 tons.

MICHIGAN—3.

- Albion Malleable Iron Company, Albion. Six annealing furnaces. Product, agricultural implement, wagon, carriage, and bicycle castings. Daily capacity, 10 tons.
- Michigan Malleable Iron Company, Detroit. Product, car and agricultural implement castings. Daily capacity, 18 tons.
- Standard Malleable Iron Company, Muskegon. Works at Muskegon Heights. Twelve annealing furnaces. Product, agricultural implement, car, carriage, and bicycle castings. Daily capacity, 15 tons.

WISCONSIN—7.

- Beaver Dam (The) Malleable Iron Company, Beaver Dam. Two double annealing furnaces. Product, all kinds of castings. Daily capacity, 10 tons.
- Belle City Malleable Iron Company, Racine. Eleven annealing furnaces. Product, electric machinery, car gears, wagon, carriage, and bicycle fittings; also agricultural implement castings. Daily capacity, 18 tons.
- Lake Side Malleable Iron Company, Racine. Four annealing furnaces. Product, all kinds of castings. Daily capacity, 6 tons.
- North-Western Malleable Iron Company, Milwaukee. Fourteen annealing furnaces. Product, agricultural implement and car castings; also detachable chains; all castings tested by chemical analysis. Daily capacity, 40 tons.
- Racine (The) Malleable and Wrought Iron Company, Racine. Five annealing furnaces. Product, bicycle, wagon, carriage, saddlery, and light castings. Daily capacity, 7 tons.
- Waukesha Malleable Iron Company, Waukesha. Four annealing furnaces. Product, bicycle, agricultural implement, railroad, and general castings. Daily capacity, 6 tons.
- Wisconsin Malleable Iron Company, Milwaukee, Milwaukee county. Twenty annealing furnaces. Product, agricultural implement, wagon, carriage, and car castings. Daily capacity, 50 tons.

MINNESOTA—2.

- Leitch Malleable Iron and Bedstead Works, St. Louis Park. Three annealing furnaces. Product, all kinds of castings. Daily capacity, 2,286 pounds. Idle.
- Wood (Walter A.) Harvester Company, St. Paul, Ramsey county. Product, agricultural implement and railroad castings.

UNITED STATES.

Number of malleable iron works in the United States in April, 1898: 88 completed and 1 building.

CAST-IRON PIPE WORKS.

The following list includes manufacturers of cast-iron gas and water pipe and cast-iron soil and plumbers' pipe. The daily melting capacity of the works when given has been furnished by the respective manufacturers, and is in gross tons of 2,240 pounds. The list also includes one plant which makes cast-steel steam pipe.

GAS AND WATER PIPE.

MASSACHUSETTS—1.

Davis and Farnum Manufacturing Company, Waltham. Sizes, from 2 to 36 inches. Daily melting capacity, 60 tons.

NEW YORK—2.

Buffalo Cast Iron Pipe Company, 280 Box ave., Buffalo, Erie county.

Sizes, from 3 to 48 inches. Daily melting capacity, 150 tons.

Utica (The) Pipe Foundry Company, Utica. Sizes, from 3 to 30 inches.

Also makes flanged pipe. Daily melting capacity, 80 tons.

NEW JERSEY—5.

McNeal (The) Pipe and Foundry Company, Burlington. New York office, 52 Wall st. Sizes, from 1½ to 60 inches inclusive. Manufactures pipe having bell and bead ends, as well as pipe with flanged ends; also pipe with flexible joints for submarine work. Daily melting capacity, 200 tons.

Warren Foundry and Machine Company, 160 Broadway, New York City. Works at Phillipsburg, Warren county. Sizes, from 3 to 48 inches inclusive. Also makes flanged pipe. Daily melting capacity, 275 tons.

Wood (R. D.) & Co., 400 Chestnut st., Philadelphia. Three works: Camden Iron Works, at Camden, Florence Iron Works, at Florence, and Millville Foundry, at Millville. Sizes, from 1 to 60 inches inclusive. Daily melting capacity, 300 tons.

PENNSYLVANIA—5 CAST IRON AND 1 CAST STEEL.

Emaus Pipe Foundry, Donaldson Iron Company, Emaus, Lehigh county. Sizes, from 1½ to 24 inches. Also makes green house pipe and flanged pipe. Daily melting capacity, 100 tons. *See Soil and Plumbers' Pipe.*

Jackson and Woodin (The) Manufacturing Company, Berwick. New York office, 47 Cedar st. Sizes, from 3 to 16 inches. Daily melting capacity, 50 tons.

National Foundry and Pipe Works Limited, Scottdale. Branch office, Pittsburgh. Sizes, from 3 to 48 inches inclusive. Daily melting capacity, 300 tons.

Reading Foundry Company Limited, Wanner Building, Reading. Two works. Sizes, from 3 to 48 inches. Daily melting capacity, 140 tons.

CAST STEEL PIPE.

Penn Steel Casting and Machine Company, Chester. Product, cast-steel steam pipe, 6 inches and above. Daily melting capacity, 20 tons.

VIRGINIA—2.

Hill City Pipe Works, The Glamorgan Pipe and Foundry Company, Lynchburg. Sizes, from 1½ to 20 inches. Daily melting capacity, 75 tons.

Radford Pipe and Foundry Company, Cincinnati, Ohio. Works at Radford. Sizes, from 2 to 36 inches. Daily melting capacity, 125 tons. Idle.

KENTUCKY—2.

Addyston (The) Pipe and Steel Company, Cincinnati, Ohio. Works at Newport, Ky. Sizes, from 3 to 60 inches. Daily melting capacity, 250 tons. *See Ohio.*

Long (Dennis) & Company, Louisville. All sizes. Daily melting capacity, 250 tons.

TENNESSEE—2.

Chattanooga Foundry and Pipe Works, Chattanooga, Hamilton county. Sizes, from 3 to 12 inches inclusive. Daily melting capacity, 150 tons. *See Alabama.*

South Pittsburg Pipe Works, South Pittsburg. Sizes, from 3 to 16 inches inclusive. Daily melting capacity, 100 tons.

ALABAMA—3.

Anniston Pipe Works, The Southern Pipe Company, Anniston. Sizes, from 3 to 60 inches. Daily melting capacity, 350 tons.

Chattanooga Foundry and Pipe Works, Chattanooga, Tenn. Works at Bridgeport. Sizes, from 14 to 36 inches inclusive. Daily melting capacity, 160 tons. *See Tennessee.*

Howard-Harrison Iron Company, Bessemer. Sizes, from 3 to 72 inches inclusive. Daily melting capacity, 300 tons.

TEXAS—1 COMPLETED AND 1 PARTLY ERECTED.

Jim Hogg Pipe Foundry, State of Texas, owner, Rusk. J. S. Rice,

Financial Agent. Sizes, from 4 to 36 inches. Daily melting capacity, 75 tons.

New Birmingham Pipe Works, Richard L. Coleman, trustee, New Birmingham, Cherokee county. Main buildings erected; cranes and other machinery in place; work suspended.

OHIO—4.

Addyston (The) Pipe and Steel Company, Cincinnati. Works at Addyston. Sizes, from 3 to 60 inches. Daily melting capacity, 350 tons. *See Kentucky.*

Clow (James B.) & Sons, Chicago, Ill. Works at Newcomerstown. Sizes, from 3 to 60 inches. Daily melting capacity, 125 tons. *See Soil and Plumbers' Pipe.*

Lake Shore Foundry, Cleveland. Sizes, from 3 to 60 inches. Daily melting capacity, 300 tons.

Ohio (The) Pipe Company, Columbus. Sizes, from 3 to 42 inches inclusive. Daily melting capacity, 175 tons.

ILLINOIS—1.

Massac Cast Iron Pipe Works, Metropolis. Sizes, from 4 to 8 inches. Daily melting capacity, 25 tons. Idle.

MICHIGAN—1.

Michigan-Peninsular Car Company, Union Trust Building, Detroit. Works at West Detroit, Wayne county. Sizes, from 4 to 42 inches. Daily melting capacity, 80 tons.

WISCONSIN—1.

West Superior Iron and Steel Works, Wisconsin Steel Company, West Superior, Douglas county. Sizes, from 4 to 24 inches. Daily melting capacity, 60 tons. *See Soil and Plumbers' Pipe.*

MISSOURI—1.

Shickle, Harrison, and Howard Iron Company, St. Louis. Sizes, from 3 to 8 inches inclusive. Daily melting capacity, 25 tons.

COLORADO—1.

Colorado (The) Fuel and Iron Company, Pueblo, Pueblo county. Principal office, Boston Building, Denver; Chicago office, Rookery Building; Salt Lake office, 202 Auerbach Building. Sizes, from 3 to 20 inches. Daily melting capacity, 60 tons.

OREGON—1.

Oregon Iron and Steel Company, Oswego. Main office, Portland; branch office, 421 Market st., San Francisco. Sizes, from 4 to 32 inches. Daily melting capacity, 40 tons.

SOIL AND PLUMBERS' PIPE.

NEW YORK—7.

Abendroth Brothers, (Corporation,) 109-11 Beekman st., New York City. Works at Port Chester. Sizes, from 2 to 8 inches inclusive. Daily melting capacity, 75 tons.

Beach & Co., Medina. Sizes, from 2 to 8 inches. Daily melting capacity, from 20 to 25 tons.

Bignall (The) Manufacturing Company, Medina. Sizes, from 2 to 8 inches. Daily melting capacity, 30 tons.

Cassidy & Adler, 533 West Fifty-fifth st., New York City. Sizes, from 2 to 15 inches. Daily melting capacity, 27 tons.

Monitor Iron Works, 76-80 Centre st., New York City. Works at Sing Sing. Sizes, from 2 to 15 inches. Daily melting capacity, 60 tons. *See New Jersey.*

Mott (The J. L.) Iron Works, 88 Beekman street, New York City. Works at Mott Haven. Sizes, from 2 to 15 inches. Daily melting capacity, 80 tons.

Swett (The A. L.) Iron Works, Albert L. Swett, proprietor, Medina. Sizes, from 2 to 8 inches. Daily melting capacity, 40 tons.

NEW JERSEY—4.

Columbian Iron Works, Ronalds and Johnson Company, 139-43 North Seventh st., Philadelphia. Works at Hainesport. Sizes, from 2 to 15 inches. Daily melting capacity, from 30 to 40 tons.

Foran and Abendroth Manufacturing Company, Flemington. Sizes, from 2 to 8 inches. Daily melting capacity, from 25 to 30 tons.

Monitor Iron Works, 76-80 Centre st., New York City. Works at Newark. Sizes, from 2 to 15 inches. Daily melting capacity, 50 tons. *See New York.*

Salem Iron Works, C. A. Blessing, main office, 516 Montgomery ave., Philadelphia. Works at Salem. Sizes, from 2 to 12 inches. Also make fittings. Daily melting capacity, from 20 to 25 tons.

PENNSYLVANIA—4.

Berlin Iron and Lead Works, The William G. Price Company, Pittsburgh. Works at Penns Station, Westmoreland county. Sizes, from 2 to 14 inches. Daily melting capacity, 50 tons.

Emaus Pipe Foundry, Donaldson Iron Company, Emaus. Hot or greenhouse pipe and flange pipe. *See Gas and Water Pipe.*

Midvale Foundry Company Limited, Allentown. Works at South Allentown. Sizes, from 2 to 15 inches. Daily melting capacity, from 50 to 60 tons.

Phoenix Foundry and Manufacturing Company, Lansdale. Sizes, from 2 to 6 inches. Daily melting capacity, about 40 tons.

DELAWARE—1.

Wilmington Pipe and Foundry Company, Wilmington. Sizes, from 2 to 6 inches inclusive. Daily melting capacity, 25 tons.

MARYLAND—3.

Bartlett, Hayward & Co., Baltimore. New York office, 15 Wall st. Sizes of standard, medium, and extra-heavy plumbers' pipe, from 2 to 12 inches; sizes of cast-iron flange pipe and fittings, from 4 to 30 inches.

Phoenix Iron Works, Henry McShane Manufacturing Company, 441 North st., Baltimore. Works at Dundalk Station, about 3 miles from Sparrow's Point and 6 miles from Baltimore. Sizes, from 2 to 15 inches inclusive. Daily melting capacity, 150 tons.

Register (J.) & Sons, Holliday and Saratoga sts., Baltimore. Works at Bay View, (a suburb of Baltimore,) Baltimore county. Sizes, from 2 to 15 inches. Daily melting capacity, 60 tons.

KENTUCKY—1.

Ahrens and Ott (The) Manufacturing Company, 327 West Main st., Louisville. Works at Sixth and A sts. Sizes, from 2 to 12 inches inclusive. Daily melting capacity, 60 tons.

TENNESSEE—1.

Shuster Foundry, South Pittsburg, Marion county. Sizes, from 2 to 12 inches. Daily melting capacity, 30 tons.

ALABAMA—4.

Alabama Pipe Company, Bessemer. Sizes, from 2 to 10 inches inclusive. Daily melting capacity, 30 tons.

Birmingham Soil Pipe Works, Birmingham Soil Pipe Company, Birmingham. Sizes, from 2 to 8 inches. Daily melting capacity, 10 tons. Idle.

Hercules Foundry, Edmund L. Tyler & Co., Anniston. Sizes, from 2 to 8 inches. Daily melting capacity, 50 tons.

Hoffmann, Billings, and Weller Manufacturing Company, 96-100 Second st., Milwaukee, Wisconsin. Works at Gadsden. Sizes, from 2 to 12 inches; also fittings. Daily melting capacity, 40 tons.

OHIO—2 COMPLETED AND 1 PROJECTED.

Clow (James B.) & Sons, Chicago, Ill. Works at Newcomerstown, Tuscarawas county. Now manufacture cast-iron gas and water pipe only, but expect to make soil and plumbers' pipe in 1898. *See Gas and Water Pipe.*

Humphryes (The) Manufacturing Company, Mansfield. Sizes, from 2 to 8 inches. Daily melting capacity, 40 tons.

Lorain Pipe Works, Lorain. Address B. E. Boise, Lorain. Idle and for sale or lease.

INDIANA—2.

Bell-Armistead (The) Manufacturing Company, Vincennes, Knox county. Sizes, from 2 to 15 inches. Daily melting capacity, 50 tons.
Kingsley Foundry Company, Hammond, Lake county. Sizes, from 2 to 6 inches. Daily melting capacity, 15 tons.

ILLINOIS—4.

Signall (S. L.) Hardware Company, 79-81 Dearborn street, Chicago. Works at St. Charles. Sizes, from 2 to 6 inches; also fittings. Daily melting capacity, 10 tons.
Illinois Malleable Iron Company, 30-32 West Monroe st., Chicago. Works at Lake View. Sizes, from 2 to 6 inches; also fittings, etc. Daily melting capacity, 16 tons.
Russell Brothers & Young, 1155 South Paulina st., Chicago. Sizes, from 2 to 6 inches. Daily melting capacity, 10 tons.
Wolff (L.) & Son, 93 West Lake st., Chicago. Sizes, from 2 to 12 inches. Daily melting capacity of pipe and fittings, from 90 to 105 tons.

WISCONSIN—3.

Hoffmann and Billings Manufacturing Company, 96-100 Second street, Milwaukee. Sizes, from 2 to 12 inches. Daily melting capacity, 25 tons.
Rundle-Spence Manufacturing Company, 63-67 Second st., Milwaukee, Milwaukee county. Sizes, from 2 to 12 inches. Daily melting capacity, 20 tons.
West Superior Iron and Steel Works, Wisconsin Steel Company, West Superior, Douglas county. Product, sewer or culvert pipe. Sizes, from 24 to 60 inches. *See Gas and Water Pipe.*

MISSOURI—1.

Blackmer and Post Pipe Company, St. Louis. Sizes, from 3 to 36 inches. Daily capacity, 60 tons of standard sewer and double strength culvert pipe.

UNITED STATES.

Number of cast-iron gas and water pipe works in the United States in April, 1898: 33 completed and 1 partly erected.

Number of cast-iron soil and plumbers' pipe works: 37 completed and 1 projected.

Number of cast-steel steam pipe works: 1.

Total number of cast-iron gas and water pipe, cast-iron soil and plumbers' pipe, and cast-steel steam pipe works in the United States in April, 1898: 71 completed, 1 partly erected, and 1 projected.

WROUGHT IRON AND STEEL PIPE WORKS.

The capacity of each works when given is in gross tons of 2,240 pounds, and has been furnished by the respective manufacturers. Some of the works named make wrought-iron pipe only, others make wrought-steel pipe only, while others make both wrought-iron and wrought-steel pipe.

CONNECTICUT—1.

Wilmot and Hobbs (The) Manufacturing Company, Bridgeport. Lock-seam steel pipe. Sizes, from $\frac{1}{2}$ of an inch to 3 inches inclusive.

NEW YORK—2.

Cohoes Tube Works, Aird, Don & Curtis, Troy. Works at Cohoes. Product, wrought iron and steel pipe. Sizes, from $\frac{1}{8}$ of an inch to 2 inches inclusive. Annual capacity, 12,000 tons.

Syracuse Tube Company, Syracuse. Product, wrought iron and steel pipe. Sizes, from $1\frac{1}{4}$ to 8 inches. Annual capacity, 22,500 tons.

NEW JERSEY—2.

Cumberland Nail and Iron Company, Bridgeton. Branch office, 207 Walnut Place, Philadelphia. Product, wrought-iron pipe. Sizes, from $\frac{1}{8}$ of an inch to $1\frac{1}{4}$ inches inclusive. Annual capacity, 3,200 tons.

New Jersey Steel Tube Company, Newark. Works at Kearney. Product, wrought iron and steel pipe. Sizes, from $\frac{1}{16}$ of an inch to $1\frac{1}{4}$ inches. Annual capacity, 1,000 tons. Specialty, tubing for umbrella rods.

PENNSYLVANIA—16.

Albright's Son & Co., Allentown. Product, wrought-iron pipe. Sizes, from $\frac{1}{8}$ of an inch to 2 inches. Specialty, $\frac{3}{4}$ -inch, 1-inch, and $1\frac{1}{4}$ -inch pipe up to 42 feet in length.

Allison (The) Manufacturing Company, Thirty-second and Walnut sts., Philadelphia. Product, wrought-iron pipe and boiler tubes.

American Tube and Iron Company, Middletown. Branch offices, New York, Boston, and Pittsburgh. Product, wrought-iron pipe. Sizes, from $\frac{1}{8}$ of an inch to 20 inches. Annual capacity, 130,000 tons.
See Ohio.

Byers (A. M.) & Co., (incorporated,) Pittsburgh. Works on Sixth st., South Side. Product, full weight wrought-iron pipe. Sizes: butt welded pipe, $\frac{1}{8}$ of an inch to $1\frac{1}{4}$ inches inclusive; lap-welded, $1\frac{1}{2}$ to 8 inches. Annual capacity, 45,000 tons.

- Chester (The) Pipe and Tube Company, 267 South Fourth st., Philadelphia. Works at South Chester. Product, wrought iron and steel pipe. Sizes, from $1\frac{1}{2}$ to 12 inches, both inclusive. Annual capacity, 70,000 tons.
- Conshohocken Tube Works, Longmead Iron Company, 434 Drexel Building, Philadelphia. Works at Conshohocken. Product, wrought-iron pipe. Sizes, from $\frac{1}{8}$ of an inch to 4 inches. Annual capacity, 9,000 tons.
- Duquesne Tube Works, E. N. Ohl, Receiver, Columbia Bank Building, Pittsburgh. Works at Duquesne. Product, wrought-iron pipe; also iron and steel boiler tubes. Sizes, from $\frac{1}{8}$ of an inch to 8 inches inclusive. Annual capacity, 33,000 tons. Idle.
- Etna Iron and Tube Works, Spang, Chalfant & Co., Pittsburgh. Office, 66-70 Sandusky st., Allegheny. Works at Etna. Product, wrought iron and steel pipe. Sizes, from $\frac{1}{8}$ of an inch to 10 inches. Annual capacity, 22,500 tons.
- National Tube Works Company, McKeesport. Branch offices, Boston, New York, Pittsburgh, Chicago, and St. Louis. Product, wrought iron and steel pipe. Sizes, from $\frac{1}{8}$ of an inch to 36 inches. Annual capacity, 250,000 tons.
- Norristown Iron Works, Executors Estate of James Hooÿen, Norristown. Product, wrought-iron pipe. Sizes, from $\frac{1}{4}$ of an inch to $2\frac{1}{2}$ inches, butt welded. Annual capacity, double turn, 5,000 tons. Idle and for sale or lease.
- Oil City Tube Company, Oil City. Product, wrought iron and steel pipe. Also steel-riveted pipe. Sizes, from $\frac{1}{8}$ of an inch to 12 inches. Annual capacity, 50,000 tons.
- Oil Well Supply Company, (Continental Tube Works,) Pittsburgh. Product, wrought iron and steel pipe. Sizes, from $\frac{1}{8}$ of an inch to 12 inches inclusive. Annual capacity, 50,000 tons.
- Pennsylvania Tube Works, 341-43 First ave., Pittsburgh. Works at Soho. Product, wrought iron and steel pipe. Sizes, from $\frac{1}{8}$ of an inch to 30 inches. Annual capacity, 150,000 tons.
- Pittsburgh (The) Tube Company, Pittsburgh. Product, wrought-iron pipe. Sizes, from $\frac{1}{8}$ of an inch to 12 inches. Idle.
- Reading Iron Company, Reading. Product, wrought-iron pipe, boiler tubes, oil-well tubing and casing, and all tubular goods. Sizes of pipe, from $\frac{3}{8}$ of an inch to 12 inches. Annual capacity, 75,000 tons.
- Tyler (The) Tube and Pipe Company, Washington. New York office, 26 Cortlandt st. Product, lap-welded knobbled charcoal iron tubes. Sizes, from 1 to 6 inches. Annual capacity, 15,000 tons. Also makes cold-drawn seamless charcoal tubes from $\frac{1}{4}$ of an inch to 4 inches.

DELAWARE—1.

Delaware Iron Company, New Castle. Morris, Tasker & Co., (incor-

porated,) sole agents, 222-24 South Third street, Philadelphia. Product, wrought iron and steel pipe. Sizes, from $\frac{3}{8}$ of an inch to 16 inches. Annual capacity, 75,000 tons.

WEST VIRGINIA—1.

Riverside Iron Works, Wheeling. Works at Benwood. Product, wrought-steel pipe. Sizes, from $\frac{1}{8}$ of an inch to 10 inches. Annual capacity, 90,000 tons.

OHIO—2.

American Tube and Iron Company, Youngstown. Main office, Middletown, Pa. Product, wrought-iron pipe. Sizes, from $1\frac{1}{2}$ to 20 inches. Annual capacity, 30,000 tons. *See Pennsylvania.*

Ohio Tube Company, Warren. Product, wrought iron and steel pipe. Sizes, from $\frac{1}{4}$ of an inch to 6 inches. Annual capacity, 40,000 tons. Pipe sold by The Union Tube and Iron Company, Warren.

ILLINOIS—2.

Crane Company, 10 North Jefferson st., Chicago. Product, wrought iron and steel pipe. Sizes, from $\frac{1}{8}$ of an inch to 2 inches. Annual capacity, 12,000 tons.

Western Tube Company, (formerly Haxtun Steam Heater Company,) Kewanee. Product, wrought iron and steel pipe. Sizes, from $\frac{3}{8}$ of an inch to 3 inches inclusive, butt welded. Annual capacity, 35,000 tons.

CALIFORNIA—1.

Risdon (The) Iron and Locomotive Works, Howard and Beale sts., San Francisco. Product, wrought iron and steel pipe; also steel-riveted pipe. Sizes, from 6 inches up.

UNITED STATES.

Total number of wrought-iron and wrought-steel pipe works in the United States in April, 1898: 28.

RIVETED PIPE WORKS.

The works named in this list are large manufacturers of iron and steel riveted pipe. Capacities are given in gross tons of 2,240 pounds.

VERMONT—1.

Dalrymple Iron Works, George Dalrymple, Fair Haven. Product, steel-riveted pipe. Sizes, from 18 to 144 inches. Annual capacity, 15,000 tons.

NEW YORK—1.

Abendroth and Root Manufacturing Company, 28 Cliff st., New York. Works at Brooklyn. Steel and iron spiral riveted pipe. Sizes, from 2 to 24 inches.

NEW JERSEY—1.

East Jersey (The) Pipe Company, Paterson. Product, steel-riveted pipe. Sizes, 24 inches and upward. Annual capacity, 200,000 feet.

PENNSYLVANIA—4.

American (The) Pipe Manufacturing Company, 112 North Broad st., Philadelphia. Works at Germantown Junction. Product, Phipps patent hydraulic riveted pipe. Sizes, from 4 to 48 inches.

Carroll-Porter (The) Boiler and Tank Company, Penn ave. and Second st., Pittsburgh. Product, iron and steel riveted pipe. Sizes, from 12 to 72 inches or larger. Annual capacity, 22,000 tons.

Oil City Tube Company, Oil City. Product, steel-riveted pipe. Also makes wrought iron and steel pipe.

Vulcan Iron Works, James McNeil & Brother, Pittsburgh. Works at Twenty-ninth st. and A. V. Ry. Product, iron and steel riveted pipe. Sizes, from 24 to 61 inches. Annual capacity, 18,000 tons.

OHIO—2.

Mahoning Boiler Works, William B. Pollock & Co., Youngstown. Product, steel-riveted pipe. Sizes, from 12 to 60 inches.

River (The) Machine and Boiler Company, 108-14 River st., Cleveland. Steel-riveted pipe of any diameter and length.

WISCONSIN—1.

Freeman (S.) and Sons Manufacturing Company, Racine. Product, steel-riveted pipe. Sizes, 12 inches and larger.

MINNESOTA—1.

Hugo Iron Works, Duluth. Product, steel-riveted pipe. Sizes, 30 inches and upward. Annual capacity, 10,000 tons.

COLORADO—2.

Weigle (The) Pipe Works, 2949-51 Larimer st., Denver. Steel-riveted pipe. Sizes, from 4 to 60 inches for water and to 12 feet for smoke. Annual capacity, 360 tons.

Young's Sheet Metal Works, John Young, 2249-51 Blake st., Denver. Steel-riveted pipe. Sizes, from 5 to 60 inches. Annual capacity, 75,000 feet.

CALIFORNIA—2.

Hooker (J. D.) Company, Los Angeles. Product, steel-riveted pipe. Sizes, from 4 inches to 6 feet in diameter.

Risdon (The) Iron and Locomotive Works, Howard and Beale sts., San Francisco, San Francisco county. Product, all sizes of steel-riveted pipe. Also makes wrought iron and steel pipe.

UNITED STATES.

Number of iron and steel riveted pipe works in the United States described in this list: 15.

SEAMLESS STEEL TUBE WORKS.

In addition to manufacturers of seamless drawn steel tubes this list also contains the names of a number of works which manufacture brazed steel tubes, lock-jointed tubes, and other tubes from sheets.

MASSACHUSETTS—2.

Houghton and Buxton Manufacturing Company, Worcester. Buys cold-drawn seamless tubes and draws ferrules and connections to 4 inches in length only.

Mannesmann Cycle Tube Works, No. 1 Broadway, New York. Works at Zylonite, Adams, Berkshire county. Product, cold-drawn seamless steel tubes. Sizes, 2 inches and under. Annual capacity, 12,000,000 feet. Also draw copper and brass tubes.

CONNECTICUT—2.

Pope (The) Tube Company, Hartford. Product, cold-drawn seamless steel tubes. Sizes, 2 inches and under. Annual capacity, 10,000,000 feet.

Wilmot and Hobbs (The) Manufacturing Company, Bridgeport. Product, bicycle and other "clinch" joint steel tubes. Sizes, from $\frac{1}{2}$ of an inch in diameter to $1\frac{3}{8}$ inches inclusive.

NEW YORK—2.

Phenix Tube Company, 138 North Eleventh st., Brooklyn. Product, brazed steel tubes. Annual capacity, 2,000,000 feet.

United States (The) Projectile Company, First ave. and Fifty-third st., Brooklyn. Product, cold-drawn seamless steel tubes. Sizes, 4 inches and smaller. Annual capacity, 6,000,000 feet.

NEW JERSEY—1.

Shelby Steel Tube Company, general office, American Trust Building, Cleveland, Ohio. Garwood Works, (Factory I.,) at Garwood. Product, cold-drawn seamless steel tubes. Sizes, $3\frac{1}{2}$ inches in diameter and

smaller. Annual capacity, 3,000,000 feet. (Formerly operated by the Hercules Seamless Drawn Tube Company.) *See Pennsylvania and Ohio.*

PENNSYLVANIA—10.

- Bloomsburg Brass and Copper Company, Bloomsburg. Product, cold-drawn seamless steel bicycle tubes. Annual capacity, 1,000,000 feet. Also manufactures seamless drawn brass, copper, and bronze tubes.
- Brown Manufacturing Company, Beaver Falls. Sales office, 20 West Water st., Chicago. Product, "Peerless" lock-jointed and "Perfection" reinforced steel cycle tubing. Sizes, from $\frac{5}{8}$ of an inch in diameter to $1\frac{1}{2}$ inches. Annual capacity, 1,000,000 feet.
- Ellwood Ivins' (The) Tube Company, 487 Broadway, New York. Branch salesrooms, 101-103 Duane st., New York, and 165 Jackson st., Chicago. Works at Oak Lane Station, Philadelphia. Product, cold-drawn steel and other seamless tubes. Sizes, from $\frac{1}{8}$ of an inch in diameter to 3 inches. Annual capacity, 2,000,000 feet.
- McCool Tube Company, Beaver Falls. Product, cold-drawn seamless steel tubes. Sizes, from $\frac{1}{4}$ of an inch in diameter to 2 inches. Annual capacity, about 8,000,000 feet.
- Millholland Tube Company, Reading. Product, cold-drawn seamless steel tubes. Sizes, from 2 inches outside diameter to minute diameter and gauges. Annual capacity, 1,000,000 feet.
- National Tube Works Company, McKeesport. Operates seamless-drawn tube works at Christy Park, near McKeesport, under the name of the United States Seamless Tube Company.
- New Castle Tube Works, New Castle Tube Company, New Castle. Product, cold-drawn seamless steel tubes. Sizes, from $\frac{1}{4}$ of an inch in diameter to 3 inches. Annual capacity, 12,000,000 feet.
- Shelby Steel Tube Company, general office, American Trust Building, Cleveland, Ohio. Two works in Pennsylvania: Ellwood Works, (Factory B.,) at Ellwood City; product, cold-drawn seamless steel tubes; sizes, from $\frac{1}{16}$ of an inch in diameter to $3\frac{1}{2}$ inches; annual capacity, about 12,000,000 feet. Greenville Works, (Factory C.,) at Greenville; product, cold-drawn seamless steel tubes; sizes, from $\frac{1}{8}$ of an inch in diameter to $4\frac{1}{2}$ inches; annual capacity, 6,000,000 feet. *See New Jersey and Ohio.*
- Tyler (The) Tube and Pipe Company, Washington. New York office, 26 Cortlandt st. Product, cold-drawn seamless charcoal iron tubes. Sizes, from $\frac{1}{4}$ of an inch in diameter to 4 inches. Annual capacity, 500,000 feet. Also makes lap-welded pipe from 1 to 6 inches.

OHIO—11.

- Berger (The) Manufacturing Company, Canton. Product, lock-jointed steel tubes. Sizes, $\frac{5}{8}$, $\frac{3}{4}$, 1, $1\frac{1}{8}$, and $1\frac{1}{4}$ inches in diameter. Annual capacity, 50,000 feet.

Cleveland (The) Brazed Fork and Tubing Company, 105 Bank st., Cleveland. Product, brazed steel tubing for bicycle purposes, chiefly for rear forks and stays, front forksides, etc. Sizes, from $\frac{1}{4}$ of an inch in diameter to 3 inches.

Coe, Powers & Co., Findlay. Product, seamless steel tubing and seamless tube specialties. Sizes, from $1\frac{1}{2}$ inches in diameter to 7 inches. Annual capacity, 12,000 gross tons.

Newark Weldless Tube and Steel Company, Newark. Product, cold-rolled weldless tubes of steel, steel and copper, brass, aluminum, etc., and lead lined and copper or brass lined steel tubes for bicycles, horseless carriages, steam boilers, etc.; also nickel-plated steel tubes for railing, metallic bedsteads, etc.; also oil-well working barrels, steel hollow shafting, etc. Sizes, from $\frac{1}{4}$ of an inch in diameter to 4 inches. Annual capacity, 2,500 gross tons.

Shelby Steel Tube Company, general office, American Trust Building, Cleveland. Formed by the consolidation in November, 1897, of The Shelby Steel Tube Company, of Shelby, Ohio; the Ellwood Weldless Tube Company, of Ellwood City, Pa.; the Greenville Tube Company, of Greenville, Pa.; and the American Weldless Tube Company and the Brewer Tube Company, of Toledo, Ohio. Five plants in Ohio. Shelby Works, (Factory A.,) at Shelby; product, cold-drawn seamless steel tubes; sizes, from $\frac{1}{8}$ of an inch in diameter to $3\frac{1}{4}$ inches; also square, rectangular, and special sections; annual capacity, 24,000,000 feet. Toledo Works, at Toledo, two plants: Factory F.; product, cold-drawn seamless steel tubes, trolley poles, etc.; sizes, from $\frac{1}{8}$ of an inch in diameter to 4 inches; annual capacity, 2,000,000 feet of seamless tubing and other drawn products. Factory D.; product, seamless drawn steel tubes; sizes, from $\frac{1}{8}$ of an inch in diameter to 6 inches; annual capacity, 3,000,000 feet. Mansfield Works, (Factory H.,) at Mansfield; product, cold-drawn seamless steel tubes; sizes, from $\frac{1}{8}$ of an inch in diameter to 3 inches; annual capacity, 5,000,000 feet; (formerly operated by the Mansfield Machine Works.) Cuyahoga Falls Works, (Factory K.,) at Cuyahoga Falls; product, cold-drawn seamless steel tubes; also cold-drawn shapes of iron or steel; sizes, from $\frac{1}{8}$ of an inch outside diameter to 3 inches; annual capacity, 2,000,000 feet of tubes; (formerly operated by the United States Standard Drawn Steel Company.) *See Pennsylvania and New Jersey.*

Standard Tube and Forkside Company, corner of Buckeye and Ketcham streets, Toledo, Lucas county. Product, steel brazed tubing, forksides, handle bars, and seat posts for bicycles. Annual capacity, 2,000,000 feet.

Toledo (The) Tube Company, Toledo, (Station B.) Product, lock-jointed steel tubes made from the very best open-hearth and cold-rolled sheet steel; also copper brazed tubes and forksides. Sizes, from $\frac{5}{8}$ of an inch in diameter to $1\frac{1}{2}$ inches.

INDIANA—1.

Albany Manufacturing Company, Albany, Delaware county. Product, cold-drawn seamless steel tubes. Sizes, from $\frac{1}{4}$ of an inch in diameter to $1\frac{1}{2}$ inches. Annual capacity, 5,000,000 feet.

WISCONSIN—1.

Smith (C. J.) and Sons Company, Park and Clinton sts., Milwaukee. Product, lap-welded brazed steel tubes for bicycles. Sizes, from $\frac{1}{2}$ of an inch in diameter to $1\frac{3}{8}$ inches; 30 inches long; No. 16 to 22 gauge. Annual capacity, about 10,000,000 feet.

UNITED STATES.

Total number of seamless-drawn steel tube, brazed tube, and lock-jointed tube works in the United States in April, 1898: 30.

STAMPING WORKS.

A nearly complete list of the stamping works of the country is given below. A number of the companies named operate tinning pots in connection with their works. Some of the works also make tinplates.

MASSACHUSETTS—2.

Dover Stamping Company, 88-90 North st., Boston. Works at Cambridgeport. Product, tinned stamped ware, etc.
Steel Edge Stamping and Retinning Works, Millis, Norfolk county. Idle and for sale. Address John S. Folsom, Millis.

CONNECTICUT—8.

Acme (The) Shear Company, Bridgeport. Product, tinned spoons and forks. Number of tinning pots, 8.
Atlas Manufacturing Company, 125 Water st., New Haven. Product, tinned spoons, stamped shelf brackets, etc.
Eastern (The) Tinware Company, 109 North Third st., Brooklyn, New York. Works at Portland, Conn. Product, retinned stamped ware, galvanized ware, and cooking utensils of all kinds. Number of tinning pots, 22.
Humphrey, (H. W.), Unionville. Product, tinned spoons and forks; also washers, ferrules, etc.
Mix (G. I.) & Co., Yalesville. Product, tinned spoons and forks.
North Haven Manufacturing Company, New Haven. Works at North Haven. Product, tinned spoons. Number of tinning pots, 3.

Parker (The Charles) Company, Meriden. Product, tinned spoons and forks.

Wallace (R.) and Sons Manufacturing Company, Wallingford. Product, tinned spoons and forks. Number of tinning pots, 41.

NEW YORK—18.

Aldrich and Ray Manufacturing Company, Buffalo. Product, brass, copper, and tinned tea kettles, tea and coffee pots, wash-boilers, etc.

American Stamping Company, 20 Cliff st., New York City. Works, 103-119 North Third st., Brooklyn. Product, tinned stamped ware, enameled ware, etc. Number of tinning pots, 4 for plates and 17 for retinning. Also operates an enameled iron ware plant at Portland, Connecticut.

Buffalo Stamping Works, Sidney Shepard & Co., 145-49 Seneca st., Buffalo. Product, stamped, pieced, and japanned sheet metal wares, milk-cans, and house-furnishing goods.

Central (The) Stamping Company, 23-25 Cliff st., New York City. Works at Brooklyn. Product, tinned stamped ware. *See New Jersey.*

Crandall, Stone & Co., Binghamton. Product, carriage hardware, stamped from tinplates and black plates.

Excelsior Stamping and Metal Company, 62-64 Elizabeth st., New York City. Product, tinned and retinned stamped ware, trays, etc. Number of tinning pots, 3.

Iron Clad Manufacturing Company, 22-24 Cliff st., New York City. Works at Brooklyn. Product, tinned stamped ware, tinplates, etc. Number of tinning pots, 19.

Jewett (The John C.) Manufacturing Company, Buffalo. Product, stampings for its own use in the manufacture of bird cages, bird cage trimmings, etc.

Lalance and Grosjean Manufacturing Company, 19 Cliff st., New York. Works at Woodhaven, Long Island. Product, stamped and enameled sheet metal ware. Makes black plates and tin and terne plates.

Lisk (The) Manufacturing Company, Canandaigua. Product, a full line of tinned stamped ware. Number of tinning pots, 9.

New York Stamping Company, North Eleventh and Berry streets, Brooklyn. Product, steel house-furnishing goods, curry combs, garden trowels, stove shovels, stove-lid lifters, etc.

Oneida Community Limited, Niagara Falls. Product, sheet steel chain, snaps, and swivels.

Riverside Manufacturing Company, 431 Mooney-Brisbane Building, Buffalo. Works on River Road. Product, miscellaneous small goods in steel stamped ware.

Rochester Stamping Works, 12 Saratoga ave., Rochester, Monroe county. Works at 141-47 Jones st. Product, copper, brass, and tinned stamped ware.

- Schlesinger (Leo) & Co., 129-31 Crosby st., New York City. Product, stampings of tin and iron in small wares.
- Sweeney (W. H.) Manufacturing Company, 66-72 Water st., Brooklyn. Product, stamped tea kettles, pots, trays, etc., plain and nickel-plated.
- Troy Stamping Works, J. M. Warren & Co., proprietors, Troy. Product, stamped tin and other metal ware.
- Vogel (William) & Brothers, 37-47 South Ninth st., Brooklyn, Kings county. Product, special stampings to order.

NEW JERSEY—1.

- Central (The) Stamping Company, 23-25 Cliff st., New York City. Works at Newark, N. J. Product, tinned stamped ware. *See New York.*

PENNSYLVANIA—6.

- Dunlap (John) Company, Second and Market sts., Pittsburgh. Product, stamped, pieced, and japanned tinware and tinware specialties. Number of tinning pots, 4.
- Haslet, Flanagan & Co., 116 North Second st., Philadelphia. Product, plain, stamped, and japanned tinware.
- Keystone Stove Board Company, C. B. Porter & Co., proprietors, 128 North Second st., Philadelphia. Works at 231 North Second st. Product, stamped stove boards.
- Melloy's (John M.) Sons, 929 Market st., Philadelphia. Product, stamped, japanned, and pieced tinware.
- Porter (C. B.) & Co., 128-30 North Second st., Philadelphia. Works at 117-21 Bread st. Product, pieced and stamped tinware.
- Sayre Stamping Works, Sayre. Product, steel dampers for smoke and heater pipes.

MARYLAND—2.

- Keen and Hagerty Manufacturing Company, 1610 Baltimore st. Works, Ostend, Race, Clement, and Creek sts. Product, enameled steel ware, galvanized ware, and tinned stamped ware. Number of tinning pots, 3.
- Matthai, Ingram & Co., 109-13 Hanover st., Baltimore. Works, Ohio avenue, and Light, Winder, and Byrd sts. Product, enameled and japanned pieced and stamped ware, tinplates, etc.

WEST VIRGINIA—1.

- Wheeling Stamping Company, Wheeling. Product, lantern, lamp, and other tin specialties. Also produces stamped brass goods.

TENNESSEE—1.

- Wetter (H.) Manufacturing Company, Carolina st. and Texas ave., Memphis. Product, stamped, pieced, and japanned tinware and galvanized ware.

LOUISIANA—1.

Haller (H.) Manufacturing Company, New Orleans. Product, stamped tinware.

OHIO—12.

Akron Hardware and Stamping Company, Akron, Summit county. Product, all kinds of sheet metal stamping, bicycle fittings, japaning, etc. For sale.

Avery (The) Stamping Company, Cleveland. Works, Coe and Lake sts. Product, tinned cooking utensils, soda tanks, and cylinder heads. Number of tinning pots, 4.

Berger (The) Manufacturing Company, Canton, Stark county. Product, stamped lantern founts, sheet metal roofing, siding, ceiling, etc.; also makes terne plates.

Cincinnati (The) Stamping Company, corner Walnut and Canal sts., Cincinnati. Product, stamped tin and japanned ware.

Cleveland (The) Stamping and Tool Company, Cleveland. Works, Hamilton and Coe sts. Product, "Solid-Steel" hollow-ware, polished, tinned, and enameled.

Gill (William A.) & Co., Columbus. Works, 350-56 North Third st. Product, tinned stamped ware.

Hero Stamping Works, 407 Cuyahoga Building, Cleveland. Works, 192-216 Scranton ave. Product, specialties in household articles and stampings for woven wire mattresses and other jobbing work. Idle and for sale.

Hunt (H. B.) Stamping Works, 14-20 Hickox st., Cleveland. Product, miscellaneous tin, iron, brass, and copper ware.

Knapp and Pratt Manufacturing Company, Geneva. Product, tinned spoons, garden trowels, malleable goods, etc.

Lawson (The F. H.) Company, 440-42 Main st., Cincinnati. Works, corner Band and Osiris sts. Product, stamped tin, japanned, and galvanized ware; also water coolers, ovens, etc.

Novelty (The) Stamping Company, Bellaire. Product, sheet steel culinary articles for enameling.

Youngstown (The) Specialty Manufacturing Company, Youngstown, Mahoning county. Product, sheet metal specialties of all kinds. Number of tinning pots, 1; also 1 galvanizing pot.

INDIANA—1.

Vienna Enamel and Stamping Works, A. J. Bowser, Receiver, Chesterton. Works at Porter, Porter county. For sale.

ILLINOIS—5.

Adams and Westlake (The) Company, 110 Ontario st., Chicago. Product, tinned stamped ware, lanterns, lamps, bicycles, cameras, railroad supplies, etc. Number of tinning pots, 4.

- Bellaire (The) Stamping Company, Harvey. Product, enameled hollow-ware for culinary use.
- Berger (Paul E.) Manufacturing Company, 11 South Water st., Chicago. Works at Chicago Ridge. Product, stamped ware, etc.
- Chicago (The) Stamping Company, Congress and Green sts., Chicago. Product, tinned milk-can stock, tinplates, etc.
- St. Louis Stamping Company, Cass ave. and Second st., St. Louis, Missouri. Works at Granite City, Illinois. Product, tinned stamped ware, tinplates, etc. Makes black plates.

MICHIGAN—1.

- Buhl Stamping Company, Detroit, Wayne county. Product, tinned stamped steel milk-can stock, tinplates, etc.

WISCONSIN—5.

- Geuder and Paeschke Manufacturing Company, St. Paul ave. and Fifteenth st., Milwaukee. Product, pieced, stamped, japanned, and galvanized tin and sheet iron ware; also steel vault, office, and library fixtures. Number of tinning pots, 2.
- Milwaukee Stamping Works, Kieckhefer Brothers Company, Milwaukee, Milwaukee county. Product, plain and retinned stamped ware, milk cans, black and galvanized steel ware, japanned ware, granite steel ware, copper ware, and pieced tinware. Number of tinning pots, 5.
- Nut and Washer Manufacturing Company, Reynolds and Wilcox sts., Milwaukee, Milwaukee county. Product, wrought and steel plate washers, rivet burrs, fellow plates, and special stampings of every description.
- Smith (C. J.) and Sons Manufacturing Company, Park and Clinton sts., Milwaukee. Product, bicycle stampings.
- Vollrath (The Jacob J.) Manufacturing Company, Sheboygan. Product, enameled stamped steel ware, enameled cast-iron ware, porcelain enameled bath tubs, sanitary goods, etc.

MISSOURI—2.

- Geisel (A.) Manufacturing Company, St. Louis. Product, cold-rolled and polished steel ovens for gas, oil, and gasoline stoves; also heating stoves, etc.
- Standard Stamping Company, 920 North Second st., St. Louis. Works, Second and Chambers sts. Product, a full line of stamped and pieced tinware and galvanized ware. Number of tinning pots, 3.

UNITED STATES.

- Number of stamping works in the United States which are described in the foregoing list: 66.

IRON AND STEEL CHAIN WORKS.

A list of the manufacturers of all kinds of iron and steel chains is given below. Sizes are given in all cases where this information has been furnished by the manufacturers. Makers of light and bicycle chains are included in the list as well as manufacturers of cable, dredge, quarry, lumber, railroad, and other heavy chains.

MAINE—1.

Lovell (John P.) Company, South Portland, Cumberland county. Steel bicycle chains. Sizes, $\frac{1}{4}$ and $\frac{3}{16}$ of an inch.

MASSACHUSETTS—9.

Baldwin Cycle Chain Company, Worcester. Bicycle chains only. Sizes, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$ of an inch; 1 inch pitch only.

Boston Gear Works, Frank Burgess, proprietor, 31 Hartford st., Boston. Large and small iron and steel chains for sprocket wheels.

Duckworth, (James,) 26 Taylor st., Springfield. Steel bicycle chains. Sizes, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, and $\frac{3}{8}$ of an inch.

Frictionless Chain Company, 289 Western ave., Lynn. Steel bicycle chains.

Harvey, (H. H.,) 218 Congress st., Boston. Norway iron and double proof quarry and contractors' chains. Sizes, from $\frac{3}{8}$ of an inch to 2 inches in diameter.

Perkins Machine Company, Brown & Wales, 69-83 Purchase st., Boston. Burns patent detachable link roller steel bicycle chains. Sizes, $\frac{3}{16}$, $\frac{1}{4}$, and $\frac{5}{16}$ of an inch.

United States Navy Yard, Charlestown. Iron and steel close and studded link chains. Sizes, close link, from $\frac{1}{4}$ of an inch to $2\frac{1}{2}$ inches; studded link, from 1 inch to $2\frac{1}{2}$ inches.

Washburn and Moen Manufacturing Company, Worcester, Worcester county. Pump chains only.

Wire (The) Goods Company, Worcester, Worcester county. "Universal" flexible chains. Sizes, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, and $\frac{1}{2}$ of an inch.

RHODE ISLAND—2.

Haskell (William H.) Company, 451 Main st., Pawtucket. Iron and steel flat-link riveted chains.

Rhode Island Tool Company, 148 West River st., Providence. Iron and steel cold-punched and drop-forged flat-link chains only.

CONNECTICUT—22.

- Aetna Hardware Company, Unionville. Double roller and common bicycle chains.
- American Pin Company, Waterbury. Bicycle chains only. Sizes, $\frac{3}{16}$ and $\frac{1}{4}$ of an inch; all lengths.
- Bridgeport Chain Company, Bridgeport. Steel wire and flat metal chains. Sizes, from No. 6 wire to No. 18.
- Cilley (The George W.) Company, Norwich. Steel bicycle chains only. Sizes, $\frac{3}{16}$, $\frac{1}{4}$, and $\frac{5}{16}$ of an inch.
- Crescent Fire Arms Company, Norwich. Steel sprocket chains. Sizes, $\frac{3}{8}$, $\frac{5}{16}$, $\frac{1}{4}$, $\frac{3}{16}$, and $\frac{1}{8}$ of an inch.
- Douglas, (W. & B.,) Middletown. Galvanized pump chains, bent cold, not welded.
- Hendryx (The Andrew B.) Company, New Haven. Iron safe chains, single and double iron chains, iron and steel ladder chains, etc.
- Holmes, Booth & Haydens, Waterbury. Iron jack chains.
- Hopkins and Allen Manufacturing Company, 132 Franklin st., Norwich. Roller bicycle chains.
- Lozier Manufacturing Company, Cleveland, Ohio. Works at Thompsonville. Steel bicycle chains. Sizes, $\frac{1}{4}$ and $\frac{3}{16}$ of an inch. *See Ohio.*
- McKee Chain and Stamping Company, Norwich. Steel bicycle chains. Sizes, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, and $\frac{3}{8}$ of an inch.
- Ossawan (The) Mills Company, Norwich. All sizes of brass, copper, and iron single and double jack, safety, and ladder chains.
- Plume and Atwood (The) Manufacturing Company, 29 Murray st., New York City. Works at Waterbury. Iron jack chains.
- Russell and Erwin Manufacturing Company, New Britain. Iron and brass jack and sash chains.
- Smith and Egge (The) Manufacturing Company, Bridgeport. Steel sash chains.
- Stanley (The) Works, New Britain. New York office, 79 Chambers st. Steel link-belting for sprockets. Sizes, Nos. 25, 32, 34, 42, 45, 51, 52, 57, 62, 67, 72 $\frac{1}{2}$, 75, 76 $\frac{1}{2}$, 77, and 88.
- Steele and Johnson Manufacturing Company, Waterbury. Iron and steel jack chains. Sizes, from No. 5 to No. 26.
- Thames (The) Chain and Stamping Company, P. O. Box 62, Norwich. Roller and block pattern bicycle chains. Sizes, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, and $\frac{3}{8}$ of an inch.
- Torrington (The) Chain Company, Torrington. Steel bicycle chains. Sizes, $\frac{3}{16}$ and $\frac{1}{4}$ of an inch.
- Turner and Seymour (The) Manufacturing Company, Torrington. Iron jack chains.
- Union Manufacturing Company, New Britain. Galvanized pump chains.
- Whitney (The) Manufacturing Company, Hartford. All the regular sizes of steel bicycle chains and chains for textile machinery.

NEW YORK—9.

American Chain Cable Works, The J. B. Carr Company, Troy. Cable, shipping, crane, dredge, quarry, rafting, and special chains of every description; some made from Burden iron. Sizes, from $\frac{5}{16}$ of an inch to $2\frac{1}{2}$ inches inclusive.

Covert Manufacturing Company, West Troy. Regular sizes of iron breast, halter, heel, post, rein, stallion, breeching, and other chains. Henry & Allen, Auburn. All sizes of steel bicycle chains.

Lefever Arms Company, Syracuse. Steel bicycle chains. Sizes, $\frac{3}{16}$ and $\frac{1}{4}$ of an inch; all lengths.

Morse Manufacturing Company, Trumansburg. Bicycle chains and chains for the transmission of power.

Morton, (Thomas,) 65 Elizabeth st., New York City. Steel sash chains.

Oneida Community Limited, Niagara Falls. New York office, 413 Broadway. Works at Niagara Falls and Ontario, Canada. Steel cut link and steel wire halter, safety, plumbers', and other chains.

Phoenix Hardware Manufacturing Company, Phoenix. Steel, bronze, and brass sash and plumbers' chains. Sizes, Nos. 0, 1, 2, and 3 sash chain, and Nos. 00, 0, 1, and 2 plumbers' chain.

Snow Cycle Chain Company, 240 West Fayette st., Syracuse. Steel bicycle chains. Sizes, $\frac{3}{16}$ and $\frac{1}{4}$ of an inch; all lengths.

NEW JERSEY—6.

Power Manufacturing Company, Bloomfield. Works at Glen Ridge. Nickel steel bicycle chains. Sizes, $\frac{3}{16}$ and $\frac{1}{4}$ of an inch wide; 1 inch pitch.

Stahl, (Harry E.,) 226 South Warren st., Trenton. Stahl's detachable link steel bicycle chains. Sizes, $\frac{1}{4}$, $\frac{3}{16}$, and $\frac{1}{8}$ of an inch.

Stockton Manufacturing Company, Newark. Detachable link steel bicycle chains. Sizes, $\frac{1}{4}$ and $\frac{3}{16}$ of an inch.

Trenton Iron Works, New Jersey Steel and Iron Company, Trenton. Iron and steel cable and harness chains. Sizes, from $\frac{3}{16}$ of an inch to $2\frac{1}{2}$ inches inclusive.

Trenton Sprocket Company, Trenton. Nickel-plated steel bicycle chains.

Woodhouse Chain Works, William Woodhouse, Third and Schenck sts., Trenton. Iron crane, dredge, coil, block, agricultural, halter, machine, American twist link, sprocket, and other chains. Sizes, from No. 12 wire gauge to $1\frac{1}{2}$ inches in diameter.

PENNSYLVANIA—20 COMPLETED AND 1 PARTLY ERECTED.

American Iron and Steel Works, Jones and Laughlins Limited, Pittsburgh. Iron and steel chains. Common chains from $\frac{3}{16}$ of an inch to $\frac{7}{8}$ of an inch in diameter, hand chains from $\frac{1}{2}$ of an inch to 2 inches in diameter, crane chains from $\frac{3}{16}$ of an inch to $1\frac{3}{8}$ of an

inch in diameter, and stud-link chains from $\frac{1}{2}$ of an inch to 2 inches in diameter.

Baker Chain and Wagon Iron Manufacturing Company, Allegheny. Nearly all kinds of iron and steel chains. Sizes, from $\frac{3}{16}$ of an inch to $2\frac{1}{2}$ inches.

Box (Alfred) & Co., 813 North Front st., Philadelphia. Works, southeast corner Front and Poplar sts. Iron block chains. Sizes, from No. 6 up to $\frac{3}{4}$ of an inch.

Carlisle Chain Works, Bower & Mallery, Carlisle. Works at Gettysburg Junction. Iron and steel coil, crane, cable, and conveyer chains; also trace and fancy chains. Sizes, from $\frac{1}{8}$ of an inch to $1\frac{1}{4}$ inches.

Chantrell Tool Company, Reading. Steel bicycle chains. Sizes, $\frac{1}{8}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, and $\frac{1}{2}$ of an inch.

Empire Chain Works, Bradlee & Co., Beach and Otis streets, Philadelphia. Product, high grade hand-made iron and combined iron and steel (no steel) chains. Sizes, from $\frac{1}{8}$ of an inch to $3\frac{1}{2}$ inches.

Frankford Chain Works, John Horton, Cambridge above Orthodox sts., Frankford, Philadelphia. Iron and steel crane and block chains. Sizes, from $\frac{3}{16}$ of an inch to 1 inch.

Garland Chain Company, Rankin Station. Iron and steel self-colored, black, and galvanized coil, brake, and crane chains from the smallest up to $1\frac{1}{4}$ inches; also "Eureka" patent weldless chain of all sizes up to $\frac{3}{8}$ wire; also galvanized pump and other chains.

Gleason, (E. & F.,) American st. and Susquehanna ave., Philadelphia. Gleason's patent roller-bearing steel bicycle chains. Sizes, $\frac{3}{16}$ and $\frac{1}{4}$ of an inch.

Harrington, (Edwin,) Son & Co. Incorporated, 1505 Pennsylvania ave., Philadelphia. Iron and steel crane, block, and special chains. Sizes, from $\frac{1}{4}$ of an inch to $1\frac{1}{2}$ inches inclusive.

Iron City Chain Works, James McKay & Co., corner Twenty-ninth st. and Liberty ave., Pittsburgh. Iron and steel coil, B B crane, B B B crane, dredge, lumber, rafting, and all kinds of railroad chains. Sizes, from $\frac{3}{8}$ of an inch to 3 inches.

Lebanon Chain Works, Lebanon. High-grade hand-made iron cable, crane, mining and rigging, dredging, machine, and other chains. Sizes, from $\frac{1}{8}$ of an inch to 3 inches.

Link Belt Engineering Company, Nicetown, Philadelphia. Iron and steel chains for conveying, elevating, and the transmission of power.

Logan Iron and Steel Works, Logan Iron and Steel Company, Burnham. Philadelphia office, Harrison Building. Chain works partly erected; work suspended.

Milesburg Chain Works, McCoy & Linn, Milesburg. All styles of iron trace, stake, wagon, breast, halter, ox and log, breeching, well, coil, and other chains. Sizes, from $\frac{3}{16}$ to $\frac{1}{2}$ of an inch.

Nes Chain Manufacturing Company, York. All kinds of iron and steel welded chains. Sizes, from No. 10 Stubs's wire gauge to 1-inch cable.

Roberts Manufacturing Company, Beaver Falls. Steel link-belt.

South Harrisburg Chain Works, South Harrisburg Chain Works Company, Harrisburg. Works at Riverton. Iron and steel coil, trace, cow, and other chains. Sizes, from $\frac{3}{16}$ of an inch to $1\frac{1}{4}$ inch.

Union Chain Works, P. O. Box 496, Pittsburgh. Iron and steel coil, crane, block, brake, agricultural, wagon, log, trace, butt, breast, and railroad chains of all kinds. Sizes, from $\frac{3}{16}$ of an inch to 1 inch.

West End Rolling Mill Company and Chain Works, Lebanon. All sizes of iron and steel hand-made chains for cranes, dredges, marine railways, and ship cables; also pitch chains.

York Chain Works, John C. Schmidt & Co., York, York county. Iron and steel coil, cable, trace, cow-tie, breast, halter, log, and wagon chains. Sizes, from No. 8 wire to 1-inch cable.

WEST VIRGINIA—1.

Shepherdstown Specialty Manufacturing Company, Shepherdstown. Steel bicycle chains only. Sizes, from $\frac{3}{16}$ to $\frac{3}{8}$ of an inch.

KENTUCKY—3.

American (The) Chain Works, South Louisville. Chicago office, Fisher Building. Iron welded and weldless wagon, harness, and other chains. All sizes up to $1\frac{1}{4}$ inches.

Falls City Chain Works, 1113 West Main st., Louisville, Jefferson county. Iron and steel coil, wagon, trace, breast, butt, and other chains. Sizes, from $\frac{3}{16}$ of an inch to $1\frac{1}{4}$ inches.

Royal (R. T.) & Co., 312 West Main st., Louisville. Works at Auburn. Steel bicycle chains. Sizes, $\frac{3}{16}$, $\frac{5}{16}$, $\frac{1}{2}$, and $\frac{3}{8}$ of an inch.

OHIO—10.

Bullock (James Wilson) & Co., 1032 Broadway, Cincinnati. Special steel bicycle chains. Size, $\frac{3}{16}$ of an inch.

Cleveland Galvanizing Works, Cleveland. Steel galvanized pump chains. Sizes, Nos. 5 and 6.

Finished (The) Steel Company, Youngstown. Figure 8 and letter B chains for bicycles.

Hayden (The P.) Saddlery Hardware Company, Columbus. All kinds of iron and steel coil, trace, stud, and other chains. Sizes, from $\frac{1}{2}$ of an inch to $2\frac{1}{2}$ inches in diameter.

H P Nail Works, American Steel and Wire Company, general office, Rookery Building, Chicago. Works at Cleveland. Iron and steel coil, wagon, trace, logging, and railroad chains; also German coil chains. Sizes, from 1 inch coil chain down to $\frac{1}{8}$ of an inch in diameter.

Jeffrey (The) Manufacturing Company, Columbus. Branch offices, 163 Washington st., New York, and 844 Equitable Building, Denver. All sizes of iron and steel chains. Product, malleable link-belt, roller, carrier, coil, drag, and steel-link chains.

Lozier Manufacturing Company, Cleveland. Works at Toledo. Steel bicycle chains. Sizes, $\frac{1}{4}$ and $\frac{3}{16}$ of an inch. *See Connecticut.*

Marion (The) Steam Shovel Company, Marion. Best quality of iron dredge chains only. Sizes, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, and $1\frac{3}{8}$ inches.

Round (D.) & Son, 2287-91 Broadway, Cleveland. High-grade iron and Norway iron dredge, crane, railroad, and mining chains; also wheel and block chains. Sizes, from $\frac{1}{8}$ of an inch to $2\frac{1}{2}$ inches inclusive.

Woodhouse, (Samuel,) 2-4 Stafford st., Cleveland. (Successor to Ohio Chain Company.) Hand-made iron crane, cable, dredge, and crown proof coil chains; also rafting, quarry, and coal mine chains to order; also sprocket and differential pulley block chains. Sizes, from $\frac{3}{16}$ of an inch to 2 inches inclusive in diameter.

INDIANA—7.

Diamond Chain Works, Indianapolis Chain and Stamping Company, Indianapolis. Steel bicycle chains. Sizes, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{8}$, and $\frac{1}{2}$ of an inch, inside width; 1 inch pitch; figure 8 and letter B block patterns.

Duthie Chain Company, 133-39 East South st., Indianapolis. Bicycle chains. Sizes, from $\frac{1}{8}$ to $\frac{3}{8}$ of an inch.

Ewart Manufacturing Company, Indianapolis, Marion county. Product, detachable malleable iron link-belt.

Falls City Chain Works, Jeffersonville. Iron and steel chains.

Indiana Chain Company, Indianapolis. Steel bicycle chains. Sizes, $\frac{1}{8}$ to $\frac{3}{8}$ of an inch.

Krein (The Franz) Chain Company, Marion. Iron and steel oil-welded proof-tested coil, BB, BBB, log, railroad brake and switch, boom, dredge, wagon, trace, breast, agricultural, halter, and other chains. Sizes, from $\frac{3}{16}$ of an inch to $1\frac{3}{4}$ inches.

Starr (W. C.) & Son, Richmond. Iron chains only.

ILLINOIS—6.

Chicago Chain Works, S. G. Taylor & Son, 98-100 Indiana st., Chicago. Best quality of iron and steel hand-made chains. Sizes, from $\frac{1}{4}$ of an inch to 2 inches.

Crown Electrical Manufacturing Company, St. Charles. Steel bicycle chains. Sizes, $\frac{3}{16}$ and $\frac{1}{4}$ of an inch.

Link-Belt (The) Machinery Company, Thirty-ninth st. and Stewart ave., Chicago. All sizes of iron and steel link-belt and steel-riveted chains.

National Sewing Machine Company, Belvidere. Bicycle chains for its own use only.

O'Leary, (Arthur J.,) 130 West Lake st., Chicago. All kinds of iron and steel chains. Sizes, from $\frac{1}{4}$ of an inch to 2 inches.

Peacock, (E. P.,) 143 South Clinton st., Chicago. Steel bicycle chains. Sizes, $\frac{3}{16}$, $\frac{1}{2}$, and $\frac{5}{16}$ of an inch.

MICHIGAN—1.

Detroit Sprocket Chain Company Limited, Detroit. Malleable detachable link-belted or drive chains. Sizes, Nos. 25 to 160 inclusive, regular list.

MISSOURI—1.

Nixdorff Krein Manufacturing Company, 900 Howard st., St. Louis. Iron and steel coil, cable, trace, wagon, and saddlery chains. Sizes, from $\frac{1}{8}$ of an inch to $1\frac{1}{2}$ inches.

UNITED STATES.

Total number of iron and steel chain works in the United States in April, 1898: 98 completed and 1 partly erected.

BOLT, NUT, AND RIVET WORKS.

The following list includes manufacturers of all kinds of iron and steel bolts, nuts, and rivets. Some of the works consume in other departments of their plants all the bolts, nuts, and rivets they produce.

MASSACHUSETTS—11.

American Bolt Company, Lowell. Product, nearly all sizes and kinds of iron and steel bolts, nuts, and rivets.

Anthony-Bates Machine Company, 13 Cypress st., Worcester. Product, iron bolts and iron and steel nuts. Sizes: bolts, to 1 inch in diameter; nuts, all sizes, rough and finished, case hardened.

Atlas Tack Company, Taunton. Product, all sizes of iron and steel rivets.

Boston Bolt Company, 31 Purchase st., Boston. Product, iron and steel bolts, nuts, and rivets. Kinds of bolts made: machinery, carriage, sleigh shoe, and tire. Sizes: bolts, from $\frac{1}{4}$ of an inch to 2 inches in diameter; nuts, from $\frac{1}{4}$ of an inch to $1\frac{1}{2}$ inches; rivets, all sizes.

Cobb & Drew, Plymouth. Product, iron and steel rivets. Sizes, 6 inches long, $\frac{7}{16}$ wire and smaller. *See Illinois.*

Kinsley Iron and Machine Works, Kinsley Iron and Machine Company, Canton. Product, special lots of iron and steel bolts, nuts, and rivets for building purposes. Also make truss rods, etc.

New England Bolt and Nut Company, 253-57 Atlantic ave., Boston.

Product, all sizes and kinds of iron and steel bolts, nuts, and rivets.

Plymouth (The) Mills, Plymouth. Product, steel bolts and Norway iron and steel rivets. Sizes: bolts, $\frac{3}{16}$ to $\frac{5}{8}$ of an inch for stoves; rivets, $\frac{7}{16}$ of an inch and smaller.

Reed and Prince Manufacturing Company, Worcester. Product, iron and steel stove and tire bolts and nuts and cold-pressed rivets up to and including $\frac{1}{2}$ of an inch in diameter.

Smith (Thomas) & Co., 14 Cypress st., Worcester. Product, all sizes and kinds of iron and steel bolts and nuts.

Somerville Spike Works, Sylvester & Co., 70 Kilby st., Boston. Works at Somerville. Product, iron bolts, chiefly for wharf and building purposes. Sizes, from $\frac{1}{2}$ of an inch to $1\frac{1}{2}$ inches.

RHODE ISLAND—3.

American Screw Company, Providence. Product, iron and steel tire, stove, sleigh-shoe, and sink bolts and nuts; also all kinds of cold-headed rivets.

Haskell (Wm. H.) & Co., Pawtucket. Product, iron and steel bolts from $\frac{3}{16}$ of an inch to $2\frac{1}{8}$ inches in diameter and any length required; also cold-punched square and hexagon iron nuts to fit $\frac{1}{8}$ of an inch to $1\frac{1}{2}$ -inch bolts. Also make coach screws and small quantities of rivets.

Rhode Island Tool Company, 148 West River st., Providence. Product, iron and steel bolts and nuts. Sizes, $1\frac{1}{4}$ inches in diameter and upward.

CONNECTICUT—16.

Aetna Nut Company, Southington. All sizes of iron and steel nuts.

Bassett, (D. M.,) Derby. Works at Shelton. Product, iron and steel carriage bolts. Sizes, from $\frac{3}{16}$ to $\frac{1}{2}$ of an inch in diameter.

Clark Brothers & Co., Milldale. Product, iron and steel bolts, nuts, and rivets. Sizes: carriage, machine, plow, and bicycle bolts from $\frac{3}{16}$ to $\frac{5}{8}$ of an inch in diameter; nuts, from $\frac{1}{8}$ to $\frac{5}{8}$ of an inch, square and hexagon; rivets, from $\frac{1}{8}$ to $\frac{1}{2}$ of an inch, with flat, oval, or counter-sunk heads.

Corbin, (P. & F.,) New Britain. Product, iron and steel bolts and nuts.

Cowles (C.) & Co., New Haven. Product, iron and steel bolts, nuts, and rivets. Sizes: bolts, from $\frac{3}{16}$ to $\frac{7}{16}$ of an inch inclusive; nuts, $\frac{5}{16}$ and $\frac{3}{8}$ of an inch; rivets, from $\frac{3}{16}$ to $\frac{5}{16}$ of an inch inclusive.

Dunham Nut Company, Unionville. Product, all sizes of iron and steel finished nuts only.

Franklin (The) Moore Company, Winsted. Product, iron and steel bolts and rivets; also iron nuts. Sizes: bolts, from $\frac{1}{8}$ to $\frac{1}{2}$ of an inch inclusive for carriage makers' use; square nuts, from $\frac{1}{8}$ to $\frac{3}{8}$ of an inch inclusive; rivets, sizes for carriage makers' use.

Frost (L. D.) & Son, Marion. Product, iron and steel bolts. Sizes,

from $\frac{3}{16}$ to $\frac{1}{2}$ of an inch in diameter inclusive. Also make nuts for $\frac{3}{16}$ to $\frac{1}{2}$ of an inch bolts for their own use.

Mount Carmel (The) Bolt Company, Mount Carmel. Product, iron and steel bolts, nuts, and rivets. Sizes: bolts, all sizes for stove and tire use; nuts, cold-punched square, not larger than $\frac{3}{8}$ of an inch; rivets, all the regular sizes.

Peck, (The) Stow, and Wilcox Company, Southington. Product, iron and steel bolts and hot-pressed nuts; also iron and steel rivets. Sizes of rivets, from $\frac{3}{16}$ to $\frac{3}{8}$ of an inch.

Reynolds & Co., 321 East Main st., New Haven. Product, iron and steel stove bolts only.

Russell and Erwin Manufacturing Company, New Britain. Product, iron and steel stove, tire, and carriage bolts; also iron and brass square and hexagon nuts.

Shelton Company, Derby. New York office, 190 Stewart Building. Works at Shelton. Product, iron and steel bolts and nuts for carriage, machine, tire, and stove use. Also makes bed screws.

Southington Cutlery Company, Southington. Product, iron and steel stove, sink, sleigh, and tire bolts; iron and steel nuts from $\frac{1}{8}$ to $\frac{3}{8}$ of an inch; also coopers', carriage, and other iron and steel rivets.

Turner and Seymour (The) Manufacturing Company, Torrington. Product, iron and steel rivets.

Upton (The) Nut Company, Unionville. Product, all sizes and kinds of iron and steel bolts, nuts, and rivets. *See Ohio.*

NEW YORK—6.

Buffalo Bolt Company, Buffalo. Works at North Tonawanda. Product, iron and steel bolts and rivets and iron nuts. Sizes: bolts, from $\frac{3}{16}$ of an inch to $1\frac{1}{2}$ inches in diameter and to any length; nuts, from $\frac{3}{16}$ of an inch to $1\frac{1}{2}$ inches; rivets, from $\frac{3}{16}$ of an inch to 1 inch in diameter. Kinds of bolts made, tire, carriage, machine, tap, etc. Also makes set and cap screws, coach screws, lag screws, etc.

Burden (The) Iron Company, Troy. Product, iron rivets. Sizes, from $\frac{1}{2}$ of an inch to $1\frac{1}{4}$ inches in diameter.

Elmira Bridge Company Limited, Elmira. Product, iron and steel bolts, nuts, and rivets. Sizes: bolts, from $\frac{1}{2}$ of an inch to 4 inches; nuts, 2 inches and larger; rivets, $\frac{1}{2}$ of an inch and larger.

New York Spike and Nail Works, Estate of Adolph Starke, 441-43 East Tenth st., New York City. Product, iron boat rivets. Sizes, $\frac{1}{4}$, $\frac{3}{8}$, and $\frac{1}{2}$ of an inch.

Port Chester (The) Bolt and Nut Company, Port Chester. Product, all kinds of iron and steel bolts, but makes a specialty of tire bolts; also makes all sizes and kinds of iron and steel nuts, but makes a specialty of cold-punched, semi-finished, and case-hardened nuts; also makes small sizes of iron and steel rivets.

Troy (The) Steel Company, Troy. New York office, 40 Wall st. Product, steel boiler, railroad, and bridge rivets. Sizes, from $\frac{1}{4}$ of an inch to $1\frac{1}{4}$ inches in diameter and $\frac{1}{2}$ of an inch to 12 inches in length.

NEW JERSEY—4.

Dover Iron Works, The Dover Iron Company of New Jersey, Dover. Product, iron and steel boiler rivets. Sizes, from $\frac{1}{2}$ of an inch to $1\frac{1}{4}$ inches in diameter.

Jersey City Spike and Bolt Works, W. Ames & Co., 312 Washington st., Jersey City. Product, iron and steel bolts and nuts. Sizes: machine bolts from $\frac{1}{2}$ of an inch to $1\frac{1}{2}$ inches in diameter; track bolts, all sizes; nuts, from $\frac{1}{2}$ of an inch to 1 inch, hot-pressed.

Passaic Rolling Mills and Bridge Works, The Passaic Rolling Mill Company, Paterson. New York office, 45 Broadway. Product, iron and steel bolts, nuts, and rivets for bridge work and buildings. Sizes, $\frac{1}{2}$ of an inch and upward.

Trenton Iron Works, New Jersey Steel and Iron Company, Trenton. New York office, Cooper, Hewitt & Co., 17 Burling Slip. Product, iron and steel bolts for their own use in the construction of bridges and buildings; also iron and steel bridge rivets. Sizes of rivets, from $\frac{1}{2}$ of an inch to $1\frac{1}{4}$ inches inclusive.

PENNSYLVANIA—23.

Allison (The) Manufacturing Company, Thirty-second and Walnut sts., Philadelphia. Product, iron and steel bolts and nuts.

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Product, iron and steel machine, pit car, track, drift, barge, and key bolts; sizes, various lengths, from $\frac{3}{8}$ of an inch to $1\frac{1}{4}$ inches in diameter; also iron and steel cone-head, counter-sunk, and button-head rivets; sizes, various lengths, from $\frac{3}{8}$ of an inch to 1 inch in diameter.

Cambria Iron Company, Harrison Building, Philadelphia. Works at Johnstown. Product, all sizes of iron and steel bolts, nuts, and rivets.

Greensburg Bolt and Nut Works, Greensburg. Product, various sizes and kinds of iron and steel bolts and nuts.

Harrisburg Car Manufacturing Company, The Commonwealth Guarantee, Trust, and Safe Deposit Company, Receiver, Harrisburg. Product, iron bolts and rivets for its own use in the building of cars. Idle and for sale.

Hoopes & Townsend, 1330 Buttonwood st., Philadelphia. Product, principally iron bolts and nuts and steel rivets. Sizes: machine bolts from $\frac{3}{16}$ of an inch to 6 inches in diameter, with square and hexagon heads; nuts, cold-punched, square and hexagon, from $\frac{3}{16}$ of an inch to 6 inches in diameter; rivets, from No. 10 to $1\frac{1}{2}$ inches in diameter for boilers, bridges, ships, tanks, and structural work.

Milton (The) Manufacturing Company, (incorporated,) Milton. Product, iron bolts, nuts, and rivets. Sizes: bolts and nuts, all sizes; rivets, $\frac{1}{4}$ of an inch and upward.

National Bolt, Nut, and Rivet Works, Reading. Product, all sizes and kinds of iron and steel bolts and nuts; also iron and steel rivets $\frac{3}{16}$ of an inch and upward.

Oliver Iron and Steel Company, Pittsburgh. Product, iron and steel bolts and rivets and iron nuts. Sizes: bolts, all lengths from $\frac{3}{16}$ of an inch to 3 inches in diameter; nuts, from $\frac{3}{16}$ of an inch to 3 inches; rivets, from $\frac{3}{8}$ of an inch to 2 inches.

Pardee Car and Machine Works, S. G. Frey, agent, Watsontown. Product, bolts and nuts for their own use in carbuilding. Idle; for sale.

Pencoyd Iron Works, A. and P. Roberts Company, 261 South Fourth st., Philadelphia. Works opposite Manayunk. Product, steel bolts, upset rods, and eye bars for bridge and structural work; also steel rivets. Sizes: bolts, from $\frac{1}{2}$ of an inch to 7 inches in diameter; rivets, from $\frac{1}{2}$ of an inch to 2 inches in diameter.

Penn Iron Company Limited, Lancaster. Product, iron bolts from $\frac{3}{8}$ of an inch to 3 inches in diameter, and iron square and hexagon nuts.

Pennsylvania Bolt and Nut Company, Lebanon. Product, iron and steel bolts and rivets and iron nuts. Sizes: bolts and nuts, all sizes and kinds; rivets, all sizes and kinds except tinner's rivets.

Pennsylvania Steel Works, The Pennsylvania Steel Company, Girard Building, Philadelphia. Works at Steelton. Product, rivets for their own use only.

Philips, Townsend & Co., North Penn Junction, Philadelphia. Product, iron and steel rivets. Sizes, $\frac{1}{2}$ of an inch and smaller.

Pittsburgh Forge and Iron Company, Tenth st. near Penn ave., Pittsburgh. Works in the ninth ward, Allegheny. Product, iron and steel track, bridge, and construction bolts and iron nuts for same; also iron and steel rivets; sizes of rivets, $\frac{5}{8}$ of an inch in diameter and upward.

Pittsburgh Manufacturing Company, Pittsburgh. Product, machine, plow, pit car, and other iron and steel bolts; all sizes of hot-pressed square and hexagon iron and steel nuts; and iron and steel bridge, tank, and boiler rivets from $\frac{1}{2}$ of an inch to $1\frac{1}{2}$ inches in diameter.

Pittsburgh Screw and Bolt Company, Pittsburgh. Works, Liberty ave. and Twenty-fifth st. Product, iron and steel coupling bolts, machine bolts, bolt ends, special head bolts, etc. Also makes milled, set, and cap screws, lag screws, etc.

Portage Iron Company Limited, Duncansville. New York office, A. R. Whitney & Co., 29 Broadway. Product, steel coopers' rivets only.

Pottsville Spike and Bolt Works, Incorporated, Pottsville. Product, all sizes of iron and steel machine, carriage, track, car, and other bolts; also all sizes of hot-pressed and forged iron nuts.

Reading Bolt and Nut Works, (not incorporated,) J. H. Sternbergh & Son, Reading. Product, all sizes and kinds of iron and steel bolts, nuts, and rivets.

Schuylkill Haven Iron Company, Schuylkill Haven. Bolt and rivet department idle.

Townsend, (C. C. & E. P.,) New Brighton. Works at Fallston. Product, iron and steel tank, sheet, coopers', and tinnerns' rivets. Sizes, $\frac{7}{16}$ of an inch in diameter and smaller.

DELAWARE—2.

Diamond State Iron Company, Wilmington. Philadelphia office, Bourse Building; New York office, 29 Broadway. Product, iron and steel machine, track, and other bolts and rods; a full line of hot and cold punched nuts; also all sizes of boiler, ship, bridge, and tank rivets.

Edge Moor Bridge Works, Wilmington. Works at Edge Moor. Product, iron and steel bolts, nuts, and rivets principally for their own use in the construction of bridges, buildings, etc. Kinds of nuts, hexagon and sleeve. Sizes of rivets, from $\frac{5}{8}$ of an inch to 1 inch.

MARYLAND—1.

South Baltimore Car Works, 44 South st., Baltimore. Works at Curtis Bay. Product, a general line of iron and steel carriage and machine bolts for their own use and for sale.

VIRGINIA—1.

Tredegear Iron Works, The Tredegear Company, Richmond. Product, iron bolts.

WEST VIRGINIA—1.

Wheeling Hinge Company, Wheeling, Ohio county. Product, all sizes of iron and steel common carriage bolts.

KENTUCKY—1.

American Nut and Bolt Company, Newport. Product, iron and steel machine, track, carriage, and plow bolts; cold-punched and hot-pressed nuts; and boiler and tank rivets.

TENNESSEE—4.

Chattanooga Car and Foundry Company, Chattanooga. Works at Boyce st. and Belt Railway crossing. Product, iron and steel bolts. Sizes, from $\frac{3}{8}$ of an inch to 2 inches.

Knoxville Iron Company, Knoxville. Bolts.

Lee Gin and Machine Company, 391-95 Front st., Memphis. Product, iron and steel machine, circle flange, drift, and special bolts; sizes, from $\frac{3}{8}$ of an inch to $2\frac{1}{2}$ inches in diameter and to any length required; also a general line of iron rivets; sizes, from $\frac{1}{4}$ to $\frac{3}{4}$ of an inch.

Memphis Car and Foundry Works, W. J. Wagner, Memphis. Product, all sizes and kinds of iron bolts and rivets.

GEORGIA—1.

Lombard Iron Works and Supply Company, Augusta. Product, iron and steel bolts. Sizes, $\frac{5}{8}$ of an inch and larger for bridge, railroad, and house work.

ALABAMA—1.

Southern (The) Bolt Company, Birmingham. Product, iron and steel bolts, nuts, and rivets.

TEXAS—1.

Texas Iron Rolling Mill, H. H. Rowland, Tyler, Smith county. Product, bolts and nuts. For sale or lease.

OHIO—13.

Atlas (The) Bolt and Screw Company, Cleveland. Product, iron and steel stove, tire, sink, and special bolts to order; also iron and steel hexagon and square cold-pressed, chamfered, and plain nuts.

Berry Brothers, Columbus. Product, steel bolts, iron nuts, and iron and steel rivets.

Bourne and Knowles (The) Manufacturing Company, cor. Main and Elm sts., Cleveland. Product, iron and steel nuts and rivets. Sizes: cold-punched nuts from $\frac{1}{4}$ of an inch to $1\frac{1}{2}$ inches; hot rivets from $\frac{1}{2}$ of an inch to $1\frac{1}{2}$ inches.

Champion Rivet Company, Euclid Avenue Station, C. & P. Ry., Cleveland. Product, steel rivets. Sizes, boiler rivets from $\frac{1}{2}$ of an inch to $1\frac{1}{2}$ inches in diameter and any length or style of head.

Chapin (The) Bolt and Nut Company, Cleveland. Product, iron bolts and nuts and steel rivets. Sizes: bolts from $\frac{3}{16}$ to $\frac{3}{4}$ of an inch in diameter; rivets, $\frac{3}{16}$, $\frac{1}{4}$, and $\frac{5}{16}$ of an inch. Nuts made consumed by the company.

Columbus Bolt Works, Columbus. Works, Randolph and Gorman sts. Product, all sizes and kinds of iron and steel bolts, nuts, and rivets.

Falls (The) Rivet and Machinery Company, Cuyahoga Falls. Product, all kinds of iron and steel coopers', tinnners', trunk, and other rivets.

H P Nail Works, American Steel and Wire Company, Rookery Building, Chicago. Works at Cleveland. Product, iron and steel tinnners', wagon, and miscellaneous rivets. Sizes, $\frac{3}{8}$ of an inch and smaller.

Kirk-Latty (The) Manufacturing Company, Cleveland. Product, all sizes of iron and steel stove and tire bolts; also nuts for its own use.

Lake Erie Iron Company, 155 St. Clair st., Cleveland. Product, iron machine, carriage, and track bolts and manufacturers' standard and United States standard sizes of iron nuts. Also makes coach screws, lag screws, etc.

Lamson and Sessions (The) Company, Cleveland. Product, iron and steel bolts and rivets and iron nuts. Sizes: bolts, all lengths and from

$\frac{5}{32}$ to $\frac{3}{4}$ of an inch inclusive in diameter; nuts, both square and hexagon, for bolts from $\frac{5}{32}$ to $\frac{3}{4}$ of an inch inclusive in diameter; rivets, nearly all lengths and styles of head from $\frac{1}{8}$ to $\frac{3}{4}$ of an inch inclusive in diameter.

Lanman, (E. B.,) Columbus. Product, all sizes of cold-punched iron and steel nuts.

Upson (The) Nut Company, Cleveland. Product, iron and steel bolts, nuts, and rivets. Sizes: bolts, machine, carriage, stove, plow, tire, and other bolts from $\frac{1}{8}$ of an inch to 2 inches in diameter inclusive; nuts, hot-pressed and cold-punched for bolts from $\frac{1}{8}$ of an inch to 3 inches in diameter; rivets from $\frac{1}{8}$ of an inch to $1\frac{1}{4}$ inches in diameter. Also makes coach screws, etc. *See Connecticut.*

INDIANA—6.

Anderson (The) Iron and Bolt Company, Anderson. Product, iron and steel bolts, nuts, and rivets. Sizes: bolts, all sizes of carriage and machine bolts, lag screws, etc.; nuts, hot-pressed square and hexagon; rivets, all sizes and kinds.

Central (The) Iron and Steel Company, Brazil. Product, iron and steel bolts, nuts, and rivets. Sizes: bolts from $\frac{1}{2}$ of an inch to 2 inches; nuts from $\frac{1}{2}$ of an inch to 2 inches; rivets from $\frac{1}{2}$ of an inch to 1 inch.

Indiana (The) Iron Company, Muncie. Product, iron and steel carriage, machine, plow, coach, bridge, track, and other bolts; all kinds of hot-forged iron and steel nuts; and iron and steel rivets, $\frac{3}{8}$ of an inch and larger, for bridge and other work.

Indianapolis Bolt and Machine Works, Parkhurst Brothers & Co., Indianapolis. Product, iron and steel bolts and rivets. Sizes: bolts, $\frac{1}{4}$ of an inch and upward; rivets, $\frac{1}{2}$ of an inch and upward.

Meeks, (J. Arthur,) Muncie. Product, iron and steel rivets. Sizes, up to $\frac{7}{16}$ of an inch in diameter and all styles of heads.

Scofield (The) Bolt Company, Anderson. Product, iron carriage, machine, and skein bolts and iron square and hexagon hot-pressed nuts, both United States and manufacturers' standard, for bolts from $\frac{3}{16}$ of an inch to 3 inches inclusive in diameter. Also makes coach screws, rods, etc.

ILLINOIS—8.

Cobb & Drew, Plymouth, Mass. Works at Rock Falls. Product, iron and steel rivets. Sizes, 6 inches long, from $\frac{7}{16}$ wire to 16 gauge. *See Massachusetts.*

Continental Bolt and Iron Works, 36-44 North Franklin st., Chicago. Product, iron and steel bolts and rivets. Sizes: bolts, all sizes of machine and special bolts; rivets, all styles, from $\frac{1}{2}$ of an inch to $1\frac{1}{2}$ inches in diameter.

Grand Crossing Tack Company, Grand Crossing, Chicago. Product, all kinds of iron and steel rivets except large boiler rivets.

Illinois Steel Company, Rookery Building, Chicago. Works at Joliet. Product, steel bolts, nuts, and rivets.

Lassig Bridge and Iron Works, 707 Rookery Building, Chicago. Product, iron and steel bolts and rivets. Sizes: bolts from $\frac{5}{8}$ of an inch to 2 inches in diameter; rivets from $\frac{1}{2}$ of an inch to 1 inch in diameter.

Peoria Steel and Iron Works, Woolner Building, Peoria. Works at Averyville, Peoria county. Product, iron and steel bolts and nuts.

Rockford Bolt Works, Rockford. Product, iron and steel bolts, nuts, and rivets. Kinds of bolts made, carriage, machine, lag, stove, and special. Sizes of bolts, nuts, and rivets, from $\frac{3}{16}$ of an inch to 1 inch in diameter.

Tudor Iron Works, 415 Locust st., St. Louis, Mo. Works at East St. Louis, Illinois. Product, iron and steel bolts, nuts, and rivets. Sizes: bolts from $\frac{5}{16}$ of an inch to 3 inches; nuts from $\frac{1}{4}$ of an inch to 2 inches; rivets from $\frac{1}{4}$ of an inch to 1 inch.

MICHIGAN—2.

Michigan Bolt and Nut Works, Detroit. Product, iron and steel bolts and rivets and iron nuts. Sizes: bolts from $\frac{3}{16}$ of an inch to 3 inches; nuts from $\frac{3}{16}$ of an inch to 2 inches; rivets from $\frac{3}{16}$ of an inch to $1\frac{3}{4}$ inches.

Muskegon Rolling Mills, Michigan Iron and Steel Company, Muskegon, Muskegon county. Product, iron and steel bolts and nuts. Sizes: bolts from $\frac{1}{4}$ of an inch to $1\frac{1}{4}$ inches; nuts, standard sizes.

WISCONSIN—4.

American Steel Barge Company, West Superior. Makes iron and steel bolts and rivets for its own use in shipbuilding.

National Elastic Nut Company, Milwaukee. Product, steel elastic self-locking nuts. Sizes, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, and $1\frac{1}{4}$ inches.

Nut and Washer Manufacturing Company, corner Reynolds and Wilcox sts., Milwaukee. Product, a few special sizes of nuts.

Racine (The) Malleable and Wrought Iron Company, Racine. Product, iron and steel bolts for bridge and construction work and all kinds of small malleable iron nuts up to 1 inch in diameter.

MINNESOTA—1.

Rupley Iron Company, Duluth. Product, all sizes and kinds of iron bolts and nuts for use in carbuilding and dock and bridge work.

MISSOURI—3.

Kansas City (The) Bolt and Nut Company, Kansas City. Product, iron and steel bolts, nuts, and rivets. Sizes and kinds: track, machine, and special bolts from $\frac{1}{4}$ of an inch to 2 inches; hot-pressed nuts from $\frac{1}{2}$ of an inch to 2 inches; structural rivets, $\frac{3}{8}$ of an inch and larger. Also makes track and boat spikes, coach screws, lag screws, etc.

Moran Bolt and Nut Manufacturing Company, Main and Florida sts., St. Louis. Product, iron and steel bolts, nuts, and rivets. Sizes: machine bolts from $\frac{1}{4}$ of an inch to 3 inches; nuts from $\frac{1}{4}$ of an inch to 3 inches; rivets, all sizes for bridge and boiler work.

St. Louis Screw Company, Thirteenth and Palm sts., St. Louis. Product, bolts and rivets for bicycle chains.

COLORADO—2.

Colorado (The) Fuel and Iron Company, Pueblo. Principal office, Boston Building, Denver. Works at Bessemer, near Pueblo. Product, iron and steel bolts, nuts, and rivets. Sizes and kinds: machine bolts, from $\frac{1}{4}$ of an inch to 1 inch, and all sizes for bridge work and pipe bands; nuts, square and hexagon, from $\frac{1}{2}$ of an inch to $1\frac{1}{2}$ inches, all standards; rivets from $\frac{1}{2}$ of an inch to $1\frac{1}{4}$ inches, with button, cone, or countersunk heads.

Denver (The) Rolling Mills and Iron Company, Denver. Iron bolts.

WYOMING—1.

Laramie (The) Iron and Steel Company, Laramie. Product, iron bolts and nuts. Sizes: bolts from $\frac{1}{2}$ of an inch to 1 inch in diameter; nuts, square and hexagon, to fit bolts from $\frac{1}{2}$ of an inch to 1 inch in diameter.

CALIFORNIA—1.

Pacific (The) Rolling Mill Company, Mission and First sts., San Francisco. Product, iron and steel bolts, nuts, and rivets. Sizes and kinds: bolts, machine and bridge, from $\frac{3}{8}$ of an inch to 3 inches; nuts, hot-pressed, from $\frac{3}{8}$ of an inch to 2 inches; rivets, boiler and ship, from $\frac{3}{8}$ of an inch to $1\frac{1}{4}$ inches.

UNITED STATES.

Total number of iron and steel bolt, nut, and rivet works in the United States in April, 1898: 117.

CAR-AXLE WORKS.

Railroad companies which make car axles are not included in the following list. Some of the works named make both rolled and forged axles. The capacity is usually given in number of axles.

MAINE—1.

Maine Iron Company, Portland. Works at Deering. Hammered steel and scrap iron axles. Annual capacity, 10,000. Idle and for sale.

NEW HAMPSHIRE—2.

✓ Cole Manufacturing Company, Lakeport. Works at Laconia. Passenger, locomotive, and street car axles. Annual capacity, 5,000.

✓ Nashua Iron and Steel Company, Nashua, Hillsborough county. Tender and truck axles. Annual capacity, 12,000.

MASSACHUSETTS—2.

✓ Boston Forge Company, 340 Maverick st., East Boston. All kinds of axles but chiefly iron axles. Annual capacity, 12,000.

✓ Cape Ann Anchor Works, Gloucester, Essex county. All kinds of iron and steel axles. Annual capacity, 12,000.

CONNECTICUT—1.

✓ Talcott Forge Works, Fred. C. Lumm, trustee, 42 Church st., New Haven, New Haven county. Works at 385 Clinton ave. Iron and steel axles. Annual capacity, 20,000. Idle and for sale.

NEW YORK—4.

✓ DeLaney Forge and Iron Company, 300 Perry st., Buffalo. Locomotive axles only. Annual capacity, 2,000.

✓ Gould Steam Forge, Gould Coupler Company, 66 Broadway, New York City. Works at Depew. Annual capacity, 7,200 locomotive or 60,000 car axles.

✓ Sizer, (William S.), Buffalo. Steel or iron locomotive axles only. Annual capacity, 14,000.

✓ Troy (The) Steel Company, Troy. New York office, 40 Wall st. Railroad and street car axles. Annual capacity, 15,000.

NEW JERSEY—2.

✓ Taylor Iron and Steel Company, High Bridge. Locomotive and car axles of Bessemer or open-hearth steel and muck or scrap iron. Annual capacity, 4,800 locomotive or 36,000 car axles.

✓ Union Steam Forge, Macpherson, Willard & Co., Bordentown. Works at White Hill. Car, tender, truck, and locomotive axles. Annual capacity, 8,000 locomotive or 30,000 car axles.

PENNSYLVANIA—22.

✓ Allentown (The) Rolling Mills, 229 Drexel Building, Philadelphia. Works at Allentown. Rolled iron axles. Annual capacity, 12,000.

✓ Cambria Iron Company, Harrison Building, Philadelphia. Works at Johnstown. Open-hearth steel axles, annealed and tempered by the Coffin process. Annual capacity, 45,000.

✓ Carnegie (The) Steel Company, Limited, Carnegie Building, Pittsburgh. Annual capacity, 70,000.

✓ Catasauqua Manufacturing Company, Catasauqua. Rolled iron axles.

Annual capacity, 5,200 gross tons. For sale. J. S. Elverson, agent, Catasauqua.

Dickson Manufacturing Company, Scranton. Hammered wrought scrap axles. Daily capacity, 40.

Du Bois (The) Iron Works, Du Bois. Mine car axles only. Annual capacity, 15,000.

Duquesne Forge, Duquesne Forge Company, Rankin. Open-hearth and nickel steel and refined iron driving axles and crank pins. Annual capacity, 2,000 tons.

Frankford (The) Steel and Forging Company, Ellwood City. Locomotive, locomotive truck, and passenger car axles. Annual capacity, 2,000 locomotive and 8,000 passenger car axles.

Green Ridge Iron Works, Susan Spencer, Scranton. Mine car axles only.

Jackson and Woodin (The) Manufacturing Company, Berwick. New York office, 47 Cedar st. Straight-rolled iron and steel axles.

Keystone Axle Company, 200 Telephone Building, Pittsburgh. Works at Morado, (post office address, Beaver Falls.) Circumferentially rolled open-hearth steel passenger and freight car axles. Annual capacity, from 50,000 to 75,000.

Lackawanna Iron and Steel Company, Scranton. Mine car axles for its own use only.

Lehigh Car, Wheel, and Axle Works, McKee, Fuller & Co., Catasauqua. Works at Fullerton. Hammered wrought scrap axles. Daily capacity, 80.

Letort Axle and Machine Works, F. Gardner's Sons, Carlisle. Works at Gettysburg Junction on the C. V. R. R. Mine car and carriage and wagon axles only. Annual capacity, 2,000 mine car axles and 40,000 sets of carriage and wagon axles.

Lockhart Iron and Steel Company, Pittsburgh. Works at McKees Rocks.

Midvale Steel Company, Nicetown, Philadelphia.

Milton (The) Iron Company, Milton. All kinds of iron car axles. Annual capacity, about 20,000.

Pencoyd Iron Works, A. and P. Roberts Company, 261 South Fourth st., Philadelphia. Works in Montgomery county, opposite Manayunk. Open-hearth steel locomotive driving axles and all kinds of car axles. Annual capacity, 70,000.

Penn Iron Company Limited, Lancaster. Hammered and rolled axles. Annual capacity, 20,000.

Pittsburgh Car Wheel Company, 506 Times Building, Pittsburgh. Works at Home and Hatfield sts. Steam, street, and electric car axles.

Pittsburgh Forge and Iron Company, Tenth st., near Penn ave., Pittsburgh. Works at Allegheny. Freight, passenger, driving, and truck axles. Annual capacity, 76,000.

Sheldon Axle Company, Wilkesbarre. Mine car axles and wagon and carriage axles only. Annual capacity, from 6,000 to 8,000 mine car axles and 400,000 sets of wagon and carriage axles.

DELAWARE—1.

Johnson Forge Company, Wilmington, New Castle county. Iron and steel car, tender, truck, and locomotive driving axles. Annual capacity, double turn, 36,000.

VIRGINIA—3.

Dora Foundry, Car Wheel, and Machine Company, Pulaski. Annual capacity, 6,000 axles.

Johnson (J. R.) & Co., Richmond. Works at Maury Station, R. & P. R. R. Hammered iron and steel car, truck, and locomotive axles. Annual capacity, 60,000.

Tredegar Iron Works, The Tredegar Company, Richmond. Car, engine, and small axles of every description. Annual capacity, 20,000.

WEST VIRGINIA—1.

Ensign (The) Manufacturing Company, Huntington. Hammered axles from wrought scrap iron. Annual capacity, 15,000.

KENTUCKY—1.

Louisville Steam Forge Company, Louisville. Works at Sixth st. and Shipp ave. Iron car, tender, truck, and locomotive axles made from fagoted selected wrought scrap iron. Annual capacity, 25,000.

ALABAMA—2.

Anniston Works, The Illinois Car and Equipment Company, Anniston. Office, 1480 Old Colony Building, Chicago, Ill.; New York office, 66 Beaver st. Car and locomotive axles. Daily capacity, 120.

Peacock's Iron Works, George Peacock, Selma. Iron and steel mine car axles. Annual capacity, 15,000.

OHIO—5.

Cincinnati Forge and Iron Department, Block-Pollak Iron Company, Cincinnati. Works at Steelton, near Carthage. Iron and steel locomotive, freight, and passenger car axles. Annual capacity, 100,000.

Cleveland City Forge and Iron Company, Cleveland. Works at Case ave. and Lake st. Iron and steel car axles. Annual capacity, 110,000.

Dorner and Dutton (The) Company, 1796 East Madison st., Cleveland. Iron and steel axles for electric cars. Annual capacity, 3,000.

Lake Erie Iron Company, 155 St. Clair st., Cleveland. Locomotive, truck, and M. C. B. car axles. Annual capacity, 48,000.

Otis (The) Steel Company Limited, Cleveland. Steel locomotive, tender, truck, and freight car axles. Annual capacity, from 75,000 to 100,000.

INDIANA—3.

Bass Foundry and Machine Works, Fort Wayne. Annual capacity, 15,000.
Central Iron and Steel Company, Brazil. Iron and steel passenger, freight, locomotive, and engine truck axles. Annual capacity, 20,000.
Inland Iron and Forge Company, 1227-29 Marquette Building, Chicago, Illinois. Works at East Chicago, Indiana. Iron and steel car and locomotive axles. Annual capacity, 25,000.

ILLINOIS—3.

Chicago Forge and Bolt Company, Fortieth st. and Stewart ave., Chicago. Locomotive, truck, passenger, and freight car axles. Annual capacity, 50,000.
Pullman's Palace Car Company, Pullman. Iron axles.
Willard (The) Sons and Bell Company, 1601 Great Northern Building, Chicago. Works at South Chicago. All kinds of car axles. Annual capacity, 75,000.

MICHIGAN—3.

Menominee Iron Works Company, Menominee. Small car axles.
Michigan-Peninsular Car Company, Union Trust Building, Detroit. Iron car axles. Annual capacity, 45,000.
Sheffield Car Company, Three Rivers. All kinds of iron and steel turned axles. Annual capacity, 20,000 car axles.

MINNESOTA—1.

Rupley Iron Company, Duluth. Freight and passenger car axles. Annual capacity, 6,000.

MISSOURI—2.

Helmbacher Forge and Rolling Mills Company, St. Louis. Iron car, tender, truck, and driving axles. Annual capacity, single turn, 24,000.
St. Louis Steam Forge and Iron Works, St. Louis. The nine-bar fagot iron axle for railway cars; also tender, truck, and driving axles; steel axles made from billets. Annual capacity, single turn, 30,000.

COLORADO—1.

Denver (The) Boiler and Sheet Iron Works Company, Denver. Mine car axles. Annual capacity, from 2,000 to 3,000.

CALIFORNIA—2.

Phelps (The) Manufacturing Company, 15 Drumm st., San Francisco. Works at Black Point. Car and locomotive axles. Annual capacity, 2,000. Idle.
Risdon (The) Iron and Locomotive Works, Beale and Howard sts., San Francisco. Mine and freight car axles. Annual capacity, 4,000.

UNITED STATES.

Total number of car-axle works in the United States in April, 1898: 62.

CAR-WHEEL WORKS.

Railroad companies which make car wheels are not included in this list. The capacities given have been reported to us by the manufacturers and relate to the number of wheels and not to tonnage.

MAINE—1.

Portland Company, Portland. Product, cast-iron wheels. Annual capacity, 7,500.

NEW HAMPSHIRE—2.

Ford & Kimball, Concord. Product, cast-iron wheels. Annual capacity, 6,000.

Laconia (The) Car Company Works, 50 State st., Boston. Works at Laconia. Product, cast-iron wheels. Annual capacity, 19,000.

VERMONT—2.

Miltimore Elastic Steel Car Wheel Company, Arlington. Product, steel-tired wheels with elastic steel centres. Annual capacity, 7,500.

St. Albans Foundry Company, St. Albans, Franklin county. Product, cast-iron wheels. Annual capacity, 7,000.

MASSACHUSETTS—2.

Swett Car Wheel and Foundry Company, George B. Swett, proprietor, Chelsea. Product, cast-iron chilled wheels. Annual capacity, 50,000.

Wason Manufacturing Company, Brightwood. Works at Springfield. Product, cast-iron chilled tread wheels. Annual capacity, 20,000.

CONNECTICUT—1.

Barnum Richardson Company, Lime Rock, Litchfield county. Product, cast-iron wheels. Annual capacity, 25,000.

NEW YORK—11.

Brooks Locomotive Works, Dunkirk. Product, Thurber steel-tired wheels.

Brown Car Wheel Works, Buffalo. Product, chilled cast-iron wheels. Annual capacity, 100,000.

Buffalo Car Wheel Works, Buffalo. Works at 534 Louisiana st. Product, cast-iron wheels. Annual capacity, 50,000. Idle.

New York Car Wheel Works, Buffalo. Product, "machined" chilled cast-iron wheels. Annual capacity, 180,000.

- Niagara Car Wheel Company, 30 Coal and Iron Exchange, Buffalo. Product, chilled cast-iron wheels for steam, electric, and street cars. Annual capacity, 200,000.
- Ramapo Wheel and Foundry Company, Ramapo. Product, chilled cast-iron wheels and steel-tired wheels. Annual capacity, 60,000 cast-iron and 12,000 steel-tired.
- Rochester Car Wheel Works, Rochester. Works at East Rochester. Product, cast-iron railroad, electric, and horse car wheels. Annual capacity, 60,000 railroad and 40,000 street car wheels.
- Steel Tired (The) Wheel Company, Boreel Building, New York City. Two works: Hudson Works; product, steel-tired wheels, paper and metal centres; annual capacity, from 12,000 to 18,000. Depew Works; product, steel-tired wheels with cast-iron or wrought-iron centres; annual capacity, 7,500. *See Pennsylvania and Illinois.*
- Thacher (George H.) & Co., Albany. Product, cast-iron wheels. Annual capacity, 70,000.
- Union (The) Car Company, Buffalo. Works at Depew. Product, chilled cast-iron wheels. Annual capacity, 200,000.

NEW JERSEY—2.

- Canda Manufacturing Company, 11 Pine st., New York City. Works at Carteret. Product, Canda contracted chilled wheels. Daily capacity, 350.
- Taylor Iron and Steel Company, High Bridge, Hunterdon county. Product, chilled cast-iron and steel-tired wheels. Annual capacity, 40,000 cast-iron and 5,000 steel-tired.

PENNSYLVANIA—20 COMPLETED AND 2 PROJECTED.

- Cayuta Wheel and Foundry Company, Sayre. Product, chilled cast-iron wheels. Annual capacity, 70,000.
- Chester Steel Castings Company, 407 Library street, Philadelphia. Works at Chester, (Lamokin Station.) Open-hearth steel wheels. Annual capacity, 30,000.
- Connellsville Machine and Car Company, Connellsville. Product, sand and chilled larry and truck wheels. Annual capacity, 20,000.
- Du Bois (The) Iron Works, Du Bois. Product, all kinds of chilled cast-iron wheels up to 24 inches. Annual capacity, 30,000.
- Eagle Iron Works, Henry Walters Sons, Tamaqua. Product, mine car wheels. Annual capacity, 10,000.
- Harman & Hassert, Bloomsburg. Product, mine car wheels. Annual capacity, 20,000.
- Harrisburg Car Manufacturing Company, The Commonwealth Guarantee, Trust, and Safe Deposit Company, Receiver, Harrisburg. Product, cast-iron wheels. Annual capacity, 36,000. Idle and for sale.
- Hazleton Iron Works Company, Hazleton. Product, mine car wheels.

- Hockensmith Wheel and Mine Car Company, Irwin. Product, mine car wheels. Annual capacity, 31,000.
- Hodge (The) Manufacturing Company, Greenville. Product, chilled or plain mine car wheels. Annual capacity, 15,000.
- Huntingdon Car Wheel Works, Huntingdon. Product, chilled cast-iron wheels. Annual capacity, 20,000. Idle and for sale or lease.
- Jackson and Woodin (The) Manufacturing Company, Berwick. New York office, 47 Cedar st. Annual capacity, 100,000 chilled freight and 55,000 mine car wheels.
- Kingston Car Wheel Company, Kingston. Works at Forty Fort. Equipped with machinery for the manufacture of special wheels under patents. Estimated annual capacity, 100,000.
- Lehigh Car, Wheel, and Axle Works, McKee, Fuller & Co., Catasauqua. Works at Fullerton. Product, cast-iron and steel-tired wheels. Daily capacity, 300 cast-iron and 50 steel-tired. Produce steel-tired wheels for The Steel Tired Wheel Company, Boreel Building, New York City.
- Marshall (John) & Co., Kittanning. Product, cast-iron coal car or pit wheels. Annual capacity, from 6,000 to 7,000.
- Pennsylvania Car Wheel Company, Pittsburgh. Works at Allegheny. Product, chilled cast-iron car wheels. Annual capacity, 150,000.
- Philadelphia Car Wheel Company, 807 Girard Building, Philadelphia. Works at Snyder avenue and Swanson street. Product, "machined" wheels for steam, street railway, and miscellaneous service. Does not now cast wheels but expects to begin casting them in the near future.
- Pittsburgh Car Wheel Company, 506 Times Building, Pittsburgh. Works at Home and Hatfield sts. Product, "machined" wheels for steam, street railway, and mine car service. Annual capacity, 45,000. Does not now cast wheels but expects to begin casting them soon.
- Reading Car Wheel Company, Buffalo, New York. Works at Reading. Product, chilled cast-iron wheels for street and railroad cars and locomotives. Annual capacity, 75,000.
- Redstone Foundry, U. Grant Miller, Uniontown. Product, pit car wheels. Annual capacity, 13,000.
- Scranton Works, The Steel Tired Wheel Company, Boreel Building, New York City. Works at Scranton. Product, steel-tired wheels with forged-iron centres. Annual capacity, 10,000. *See New York and Illinois.*
- Standard (The) Steel Works, Harrison Building, Philadelphia. Works at Burnham. Product, steel-tired wheels with forged wrought-iron centres. Annual capacity, 15,000.

DELAWARE—1.

- Lobdell Car Wheel Company, Wilmington. Product, all kinds of steam, street, mine, and push-car wheels. Annual capacity, 180,000.

MARYLAND—1.

Baltimore (The) Car Wheel Company, Baltimore. Works at Fulton Junction, Baltimore. Product, all kinds of chilled wheels and electric motor and cable trucks. Annual capacity, 120,000.

VIRGINIA—3.

Dora Foundry, Car Wheel, and Machine Company, Pulaski. Product, charcoal iron wheels, chilled and annealed; self-oiling wheels, etc. Annual capacity, 30,000.

Old Atlantic Iron Works, W. A. Anderson, Norfolk. Product, cast-iron tram wheels. Annual capacity, from 1,500 to 2,000.

Tredegar Iron Works, The Tredegar Company, Richmond. Product, car, engine, and mine car wheels. Annual capacity, 30,000.

WEST VIRGINIA—2.

Bluefield Iron Works, William A. Cather, Bluefield. Product, mine and logging wheels. Annual capacity, 8,000.

Ensign (The) Manufacturing Company, Huntington. Product, patent contracting cast-iron chilled wheels. Annual capacity, 90,000. Also solid and patent self-oiling mine and logging wheels; annual capacity, 12,000.

NORTH CAROLINA—1.

North Carolina Car Company, Raleigh. Product, cast-iron chilled wheels. Annual capacity, 12,000.

KENTUCKY—1.

Louisville Car Wheel and Railway Supply Company, Louisville. Product, chilled cast-iron wheels. Annual capacity, 50,000.

TENNESSEE—4.

Chattanooga Car and Foundry Company, Chattanooga. Product, chilled cast-iron wheels. Annual capacity, 20,000.

Knoxville Car Wheel Company, L. H. Spilman, Receiver, Knoxville. Product, chilled cast-iron wheels. Annual capacity, 50,000. Idle since June, 1892.

Lenoir Foundry Company, Lenoir City. Product, chilled wheels of superior quality for locomotives, and for passenger, freight, and mine cars. Daily capacity, from 200 to 300 wheels.

Memphis Car and Foundry Works, W. J. Wagner, Memphis. Product, freight and passenger car wheels. Annual capacity, 65,000.

ALABAMA—4.

Decatur Car Wheel and Manufacturing Company, Birmingham, Jefferson county. Product, chilled cast-iron and mine car wheels. Annual capacity, 125,000.

Elliott (The) Car Company, Gadsden. Product, charcoal cast-iron standard M. C. B. railroad wheels. Annual capacity, 48,000.

Hood Machine Company, Birmingham. Product, 12, 14, and 16-inch mine car wheels. Annual capacity, about 14,000.

Peacock's Iron Works, George Peacock, Selma. Product, all kinds of large and small car wheels. Annual capacity, 35,000 self-oiling and 15,000 plate wheels.

LOUISIANA—1.

Henderson (The W. K.) Iron Works, Shreveport, Caddo county. Product, cast-iron wheels. Annual capacity, 50,000.

TEXAS—2 COMPLETED AND 1 PARTLY ERECTED.

Dickson Car Wheel Company, Houston. Product, double-plate or spoke cast-iron wheels. Annual capacity, 50,000.

Jefferson Iron Company, Jefferson. Buildings partly erected; work suspended.

Marshall Car Wheel and Foundry Company, Marshall. Product, engine, tender, truck, and other wheels. Annual capacity, 50,000.

OHIO—10.

Atlas (The) Bolt and Screw Company, Cleveland. Product, mine and light car wheels. Annual capacity, 25,000.

Barney and Smith Car Company, Dayton. Product, cast-iron steam and street car wheels. Annual capacity, 10,000.

Cleveland (The) Wheel and Foundry Company, 20 Carter st., Cleveland. Product, chilled passenger, freight, and mine car wheels. Annual capacity, 50,000.

Dorner and Dutton (The) Company, 1796 East Madison st., Cleveland. Product, chilled wheels for electric railways. Annual capacity, 6,000.

Fulton (The) Foundry Company, 202 Merwin st., Cleveland. Product, street car wheels only. Annual capacity, 20,000.

Lima (The) Locomotive and Machine Company, Lima. Product, chilled cast-iron and steel-tired wheels. Annual capacity, 30,000 chilled and 1,000 steel-tired wheels.

Mowry (The) Car Wheel Works, The Mowry Car Wheel Works Company, 2401 Eastern avenue, Cincinnati. Product, railroad and street car wheels. Annual capacity, 4,000.

Nelsonville (The) Foundry and Machine Company, Nelsonville, Athens county. Product, self-oiling chilled mine car wheels. Annual capacity, 70,000.

Standard (The) Car Wheel Company, Bessemer avenue, Cleveland. Product, chilled locomotive, passenger, freight, and mine car wheels. Annual capacity, 75,000.

Watt (The) Mining Car Wheel Company, Barnesville. Product, chilled self-oiling mine car wheels. Annual capacity, 60,000.

INDIANA—6.

- Bass Foundry and Machine Works, Fort Wayne. Product, cast-iron wheels. Annual capacity, 150,000.
- Haskell and Barker Car Company, Michigan City. Product, chilled cast-iron wheels. Annual capacity, 50,000.
- Indiana Car and Foundry Company, Indianapolis. Works at West Indianapolis. Product, all kinds of railroad car wheels. Annual capacity, 60,000.
- Ohio Falls (The) Car Manufacturing Company, Jeffersonville, Clark county. Product, all kinds of cast-iron wheels. Annual capacity, 75,000.
- Terre Haute Car and Manufacturing Company, Terre Haute. Product, Barr contracting chilled cast-iron freight and street car wheels. Annual capacity, 100,000.
- Treat (C. A.) Manufacturing Company, Hannibal, Missouri. Works at East Chicago, Indiana. Cast-iron car wheels. *See Missouri.*

ILLINOIS—10.

- Barker Mine Car and Foundry Company, Springfield. Product, roller-bearing, self-oiling, and plain chilled car wheels for mine cars. Annual capacity, from 15,000 to 20,000.
- Barnum and Richardson Manufacturing Company, 64 South Jefferson st., Chicago. Product, chilled cast-iron wheels in Barr contracting chills for cars and locomotives; also wheels for motor, horse, and cable cars. Annual capacity, 80,000.
- Fort Wayne Foundry and Machine Company, 707 Rookery Building, Chicago. Works at Clark and Forty-seventh sts. Product, chilled cast-iron car, engine, tender, truck, and driving wheels. Annual capacity, 45,000.
- Griffin Wheel Company, 503 Western Union Building, Chicago. Works at Sacramento ave. and C. & N. W. Ry. Product, chilled cast-iron wheels for locomotives, electric motor, horse, cable, and other cars. Annual capacity, 250,000. *See Michigan, Minnesota, Colorado, and Washington.*
- Madison Works, Missouri Car and Foundry Company, Houser Building, St. Louis, Missouri. Works at Madison, Illinois. Product, chilled cast-iron wheels for passenger, freight, engine, logging, mine, motor, and other cars. Annual capacity, 300,000. *See Missouri.*
- Mount Vernon Car Manufacturing Company, Mount Vernon, Jefferson county. Product, chilled cast-iron car and locomotive wheels. Annual capacity, 80,000.
- Pullman's Palace Car Company, Pullman. Product, chilled cast-iron freight and passenger car wheels for its own use only. Annual capacity, 100,000.
- Pullman Works, The Steel Tired Wheel Company, Boreel Building,

New York City. Works at Pullman. Product, steel-tired wheels, paper and metal centres. Annual capacity, from 12,000 to 18,000. *See New York and Pennsylvania.*

Steel Truss (The) Car Wheel Company, Shenandoah and Lemp aves., St. Louis, Missouri. Works at Edwardsville, Illinois. Product, steel-tired and steel-centre wheels. Annual capacity, about 5,000.

Wells and French (The) Company, Fisher Building, Chicago. Works at Paulina and Blue Island avenues. Product, all kinds of chilled cast-iron wheels. Annual capacity, 130,000.

MICHIGAN—9.

Grand Rapids Iron Works, Butterworth & Lowe, Grand Rapids. Product, single-plate chilled wheels for logging, lumber, and other cars. Annual capacity, 10,000.

Griffin Wheel Company, (Detroit Plant,) Detroit. Product, chilled cast-iron wheels. Annual capacity, 75,000. *See Illinois, Minnesota, Colorado, and Washington.*

Kalamazoo Railroad Velocipede and Car Company, Kalamazoo, Kalamazoo county. Product, velocipede, hand, and mine car wheels. Annual capacity, 20,000.

Lake Shore Iron Works, 115 East Washington st., Marquette, Marquette county. Product, mine car wheels. Annual capacity, from 1,000 to 1,200.

Menominee Iron Works, Menominee. Product, chilled cast-iron wheels. Annual capacity, 6,000.

Michigan-Peninsular Car Company, (successor to the Michigan Forge and Iron Company,) Union Trust Building, Detroit, Wayne county. Product, chilled cast-iron wheels. Daily capacity, 700.

Roberts, Throp & Co., (incorporated,) Three Rivers. Product, light steel wheels for hand, push, and velocipede cars.

Russel Wheel and Foundry Company, Detroit, Wayne county. Product, chilled cast-iron plate and spoke wheels. Annual capacity, 40,000.

Sheffield Car Company, Three Rivers. Product, chilled plate and spoke wheels for flat cars, logging cars, etc., pressed and rolled wrought-steel plate wheels for hand and push cars, wrought-steel wheels with self-oiling hubs for ore and mine cars, and wood-centre steel-tired wheels. Annual capacity, 25,000.

WISCONSIN—1.

Shaw (The) Steel Casting Company, Milwaukee. Street car wheels.

MINNESOTA—2.

Griffin Wheel Company, Phalen and Stillwater aves., St. Paul. Product, all kinds of chilled iron wheels. Annual capacity, 90,000. *See Illinois, Michigan, Colorado, and Washington.*

Rupley Iron Company, Duluth. Product, cast-iron wheels. Annual capacity, 40,000.

MISSOURI—5.

Industrial Iron Works, Pierce & Hall, Clinton. Product, cast-iron mine car wheels. Annual capacity, 25,000.

Missouri Car and Foundry Company, Houser Building, St. Louis. Works at 2301 Kosciuszko st. Product, chilled cast-iron wheels for locomotive, passenger, freight, motor, mine, ore, logging, truck, and cable cars. Annual capacity, 300,000. *See Illinois.*

St. Charles Car Company, St. Charles. Product, chilled cast-iron wheels. Annual capacity, 86,000.

St. Louis Car Wheel Company, city office, 504-5 Bank of Commerce Building, St. Louis; general office and works, Spring ave. and Mo. Pac. R. R., St. Louis. Product, cast-iron chilled car, engine, street, mine, and lumber car wheels. Annual capacity, 120,000.

Treat (C. A.) Manufacturing Company, Hannibal. Product, cast-iron wheels. Annual capacity, 25,000. *See Indiana.*

KANSAS—1.

Kansas City Car and Foundry Company, Kansas City. Product, cast-iron locomotive, passenger, freight, logging, mine, and street car wheels. Annual capacity, 90,000.

COLORADO—2.

Davis (The F. M.) Iron Works Company, 723 Larimer st., Denver. Product, chilled cast-iron mine car wheels up to 24 inches. Annual capacity, 50,000.

Griffin Wheel Company, Boston Building, Denver. Works at Overland, a suburb of Denver. Product, chilled cast-iron wheels. Annual capacity, 50,000. *See Illinois, Michigan, Minnesota, and Washington.*

WASHINGTON—1.

Griffin Wheel Company, South Tacoma. Product, chilled cast-iron wheels. Annual capacity, 50,000. *See Illinois, Michigan, Minnesota, and Colorado.*

CALIFORNIA—2.

Occidental Foundry, Steiger & Kerr, San Francisco. Product, locomotive and street car wheels.

Risdon (The) Iron and Locomotive Works, Beale and Howard sts., San Francisco. Product, mine and railway car wheels.

UNITED STATES.

Total number of car-wheel works in the United States in April, 1898, not including works operated by railroad companies: 110 completed, 1 partly erected, and 2 projected.

CARBUILDING WORKS.

This list does not include railroad companies which build cars.

MAINE—1.

Portland Company, Portland, Cumberland county. Wooden freight cars. Annual capacity, 350 flat and box cars.

NEW HAMPSHIRE—1.

Laconia (The) Car Company Works, 50 State st., Boston. Works at Laconia, Belknap county. Wooden cars only. Annual capacity, 1,500 freight, 150 passenger, and 1,000 street cars.

MASSACHUSETTS—7.

Bradley Car Works, Osgood Bradley & Sons, Worcester, Worcester county. Wooden cars. Annual capacity, 100 passenger and 700 freight cars.

Briggs Carriage Company, Amesbury. Street cars only. Annual capacity, 300.

Keith Manufacturing Company, Isaac N. Keith & Son, Sagamore, Barnstable county. All kinds of wooden freight cars. Annual capacity, 800.

Massachusetts Car Company, Exchange Building, Boston. Works at Ashburnham. Street cars only. Annual capacity, from 300 to 600. Idle and for sale.

Newburyport Car Manufacturing Company, Newburyport. Wooden electric street cars only. Annual capacity, 300.

Randall Street and Electric Manufacturing Company, 1131 Tremont st., Roxbury, Boston. Wooden street and electric cars of all kinds. Annual capacity, from 100 to 300.

Wason Manufacturing Company, Brightwood. Works at Springfield. All kinds of cars for steam or electric railways. Daily capacity, 1 passenger, 2 electric street, and 6 freight cars.

NEW YORK—12.

Buffalo Car Manufacturing Company, 31 Coal and Iron Exchange, Buffalo, Erie county. All kinds of wooden freight cars. Annual capacity, 7,000.

Hunt (C. W.) Company, 45 Broadway, New York City. Works at West New Brighton, Staten Island. Narrow-gauge cars, less than 30-inch gauge. Annual capacity, 3,500.

Jones' Car Works, J. M. Jones' Sons, West Troy. Wooden electric and cable cars for street and suburban railways only. Annual capacity, 600.

Merchants Despatch Transportation Company, Despatch, near Rochester. Wooden refrigerator and box cars for its own use. Annual capacity, 3,600 box and 700 refrigerator cars.

Ramapo Iron Works, Hillburn. New York office, 1304 Havemeyer Building. Plantation, mine, logging, and standard or narrow-gauge freight cars. Annual capacity, about 1,500.

Rogers (A. L.) & Co., 108 Wall st., New York City. Works at Van Pelt Manor Station. Wooden street, electric, and cable cars only. Annual capacity, 300.

Stephenson (John) Company Limited, 47 East Twenty-seventh st., New York City. Street railway cars of all kinds. Annual capacity, 700. *See New Jersey.*

Stuebner, (G. L.,) 166-76 Third st., Long Island City. Narrow-gauge iron, steel, or wooden flat, tip, and bottom dump cars for coal, etc. Annual capacity, 500.

Troy Car Works, Atlantic Trust Company, 39 William st., New York City. Works at Troy. All kinds of cars for both steam and street railways. Idle and for sale.

Turl's Iron Works, John Turl's Sons, 534-36 West Twenty-eighth st., New York City. Works at foot of West Twenty-seventh and West Twenty-eighth streets. Plantation, mine, and sugar cars of wood; also all patterns of iron and steel cars for grain, coffee, coal, etc. Daily capacity, about 100.

Union (The) Car Company, Buffalo. Works at Depew, Erie county. Wooden freight cars of all kinds. Annual capacity, 10,000.

Wagner Car Works, Wagner Palace Car Company, Buffalo. Sleeping, passenger, parlor, dining, buffet, and other cars. Annual capacity, 250.

NEW JERSEY—3.

Brooklyn and New York Railway Supply Company, Elizabeth. Wooden electric, cable, horse, and other street railway cars. Annual capacity, 1,800.

Canda Manufacturing Company, 11 Pine st., New York City. Works at Carteret, Middlesex county. Freight and passenger cars. Annual capacity, 6,000.

Stephenson (John) Company Limited, 47 East Twenty-seventh st., New York City. Works at Elizabeth, Union county. Wooden street, electric, cable, horse, and elevated cars. Annual capacity, 1,500. *See New York.*

PENNSYLVANIA—27.

Allison (The) Manufacturing Company, Thirty-second and Walnut streets, Philadelphia. Iron, steel, and wooden freight cars of every description and electric trucks.

Billmeyer and Small Company, York. Annual capacity, 200 passenger and 1,500 freight cars.

Bloomsburg Car Manufacturing Company, Bloomsburg. Iron, steel, and wooden cars. Annual capacity, 2,000 freight, 5,000 dump, and 3,000 mine cars. Builds cars for export.

Carlin's (Thomas) Sons, 186-90 Lacock st., Allegheny. Works at 386-98 River ave. Iron and steel flat cars for steel works, copper mills, etc.; also wood and steel narrow-gauge flat hand cars for contractors and quarries. Annual capacity, about 600 flat and 400 dump cars.

Carlisle Manufacturing Company, Carlisle. Freight and mine cars. Annual capacity, 3,000. For sale.

Connellsville Machine and Car Company, Connellsville. Iron mine cars; also wooden coke, construction, and dump cars. Annual capacity, about 2,500.

Davies Brothers and Hartman, 18 North Seventh st., Philadelphia. Works at 1233-37 North Front st. Iron and steel liquid cinder cars, furnace barrows, etc. Annual capacity, 200.

Du Bois (The) Iron Works, Du Bois. Wooden mine and logging cars. Annual capacity, 12,000.

Erie Car Works, Erie. Wooden flat, box, gondola, hopper-bottom, and other freight cars. Annual capacity, 2,400.

Everson Car Works, H. C. Frick Coke Company, Scottdale. Works at Everson. Wooden coke cars for their own use only.

Forest City Car and Manufacturing Company, Forest City. Mine cars only. Annual capacity, 5,000. Idle and for sale.

Harman & Hassert, Bloomsburg. Annual capacity, 2,000 mine and construction cars.

Harrisburg Car Manufacturing Company, The Commonwealth Guarantee, Trust, and Safe Deposit Company, Receiver, Harrisburg. Annual capacity, 4,000 freight cars. Idle for several years and for sale.

Hockensmith Wheel and Mine Car Company, Irwin. Wooden mine cars only. Annual capacity, 2,000.

Jackson and Woodin (The) Manufacturing Company, Berwick. New York office, 47 Cedar st. Annual capacity, 4,000 freight, mine, and construction cars.

Lebanon Manufacturing Company, Lebanon. Iron, steel, and wooden cars. Annual capacity, 3,500 freight, 150 street, 50 passenger, 200 refrigerator, and 200 mine cars; also 75 tenders.

Lehigh Car, Wheel, and Axle Works, McKee, Fuller & Co., Catasauqua. Works at Fullerton, Lehigh county. Daily capacity, 20 freight cars.

- Lehigh Valley Car Company, Northampton. Annual capacity, 2,000 freight, coal, and mine cars. Idle and for sale.
- Middletown Car Works, Middletown. Iron, steel, and wooden freight, mine, and caboose cars. Annual capacity, 2,500.
- Milton Car Works, Murray, Dougal & Co. Limited, Milton. All kinds of freight cars. Annual capacity, 3,500.
- New Castle (The) Car Manufacturing Company, New Castle. Wooden passenger and freight cars for street railroads. Annual capacity, 150 freight and 150 passenger cars.
- New York and Cleveland Gas Coal Company, Pittsburgh. Works at Turtle Creek. Wooden hopper and gondola coal cars for its own use only.
- Pardee Car and Machine Works, Watsontown. Annual capacity, 2,100 freight cars. Idle and for sale.
- Philadelphia Car Works, J. G. Brill Company, Sixty-second st. and Woodland ave., Philadelphia. Annual capacity, 100 passenger, 500 freight, and 1,800 street cars; also 5,000 electric motor trucks.
- Phillips Mine Supply Company, Pittsburgh. Works on South Twenty-third st. Iron, steel, and wooden mine, dump, and small flat cars; also mill trucks. Annual capacity, about 8,000.
- Schoen Pressed Steel Company, Pittsburgh. Works at Allegheny. Steel freight cars, trucks, etc.
- Weimer Machine Works Company, Lebanon. Iron and steel cars for removing liquid or dry cinder from blast furnaces, liquid metal for steel works, etc.; also other iron cars. Annual capacity, 350.

DELAWARE—2.

- Delaware Car Works, Jackson and Sharp Company, Wilmington. New York office, Downing Building; Philadelphia office, 204 South Fifth st.; London office, 26 Victoria st., Westminster. All kinds of sleeping, parlor, express, mail, baggage, passenger, electric, street, and cable cars; build cars with iron underframes. Sectional work for export a specialty.
- Harlan and Hollingsworth (The) Company, Wilmington. New York office, 86 Boreel Building; London office, Dashwood House, 9 New Broad st., E. C. All kinds of wooden parlor, boudoir, sleeping, passenger, and baggage cars; also a few iron and steel cars. Sectional work for export a specialty.

MARYLAND—2.

- Ryan-McDonald Manufacturing Company, 44 South street, Baltimore. Works at Curtis Bay. Iron, steel, and wooden narrow-gauge and contractors' cars of all kinds. Annual capacity, 2,000.
- South Baltimore Car Works, 44 South st., Baltimore. Works at Curtis Bay. Wooden cars only. Annual capacity, 4,000 freight cars.

VIRGINIA—3.

American (The) Car Works, Basic City. Annual capacity, 1,000 freight and express cars. Idle and for sale. Address G. G. Gooch, Staunton, Va., or M. A. Booker, Hampton, Va.

Bodley Wagon Company, Staunton. Wooden plantation, mine, and logging cars. Annual capacity, 10,000.

Dora Foundry, Car Wheel, and Machine Company, Pulaski, Pulaski county. All kinds of iron, steel, and wooden mine cars. Annual capacity, 3,000.

WEST VIRGINIA—1.

Ensign (The) Manufacturing Company, Huntington. Annual capacity, 4,500 freight cars.

TENNESSEE—3.

Chattanooga Car and Foundry Company, Chattanooga, Hamilton county. Iron, steel, and wooden freight, oil tank, mine, construction, plantation, and cane cars. Annual capacity, 1,000 freight, 1,000 mine, and 2,000 cane cars.

Lenoir (The) Car Company, Lenoir City. All kinds of wooden freight, mine, logging, and cane cars. Annual capacity, 3,000 standard freight cars.

Memphis Car and Foundry Works, W. J. Wagner, Memphis, Shelby county. Freight, caboose, tank, logging, and other cars. Daily capacity, 15.

NORTH CAROLINA—1.

North Carolina (The) Car Company, Raleigh. Annual capacity, 600 freight cars.

GEORGIA—1.

Georgia Car and Manufacturing Company, Savannah. Iron, steel, and wooden freight cars of every description; also street cars. Annual capacity, 3,000.

ALABAMA—5.

Alabama Bridge and Boiler Works, Birmingham. Iron, steel, and wooden tram cars and all styles of cars for blast-furnace use. Annual capacity, from 500 to 1,000.

Anniston Works, The Illinois Car and Equipment Company, Anniston. Chicago office, 1480 Old Colony Building; branch office, 66 Beaver st., New York. Wooden cars only. Annual capacity, 12,000 freight cars. *See Ohio and Illinois.*

Elliott (The) Car Company, Gadsden. Freight cars. Annual capacity, 3,600.

Peacock's Iron Works, George Peacock, Selma. Mine, logging, push, cane, and other small cars. Annual capacity, 5,000.

Union Iron Works Company, Selma, Dallas county. Logging, push, and cane cars. Annual capacity, 1,000 of each.

LOUISIANA—1.

Henderson (The W. K.) Iron Works, Shreveport, Caddo county. Logging and cane cars. Annual capacity, 1,000 logging and 10,000 cane cars.

TEXAS—2.

Beaumont Iron Works, O. B. Greeves, Beaumont, Jefferson county. Wooden logging and cane cars. Annual capacity, 600 logging and 1,000 cane cars.

Marshall Car Wheel and Foundry Company, Marshall. Annual capacity, 1,000 logging, 300 flat, and 10,000 cane cars.

OHIO—11.

Atlas (The) Bolt and Screw Company, Cleveland, Cuyahoga county. Brick, mining, and industrial railway cars of every description. Annual capacity, 10,000.

Barney and Smith Car Company, Dayton. Annual capacity, 350 sleeping and other passenger and baggage cars, 6,000 freight cars, and 1,000 street and electric cars.

Illinois (The) Car and Equipment Company, 1480 Old Colony Building, Chicago; branch office, 66 Beaver st., New York. Works at Urbana, Champaign county. Wooden freight and refrigerator cars only, but can build iron and steel cars. Annual capacity, 10,000. *See Alabama and Illinois.*

Jewett Car and Planing Mill Company, Jewett. All kinds of wooden electric street cars. Annual capacity, about 300.

Kilbourne and Jacobs (The) Manufacturing Company, head of Lincoln st., Columbus, Franklin county. Small steel and wooden cars of every description, including contractors' dump cars, ore cars, railway hand and push cars, brick and tram cars, sugar cars, etc., etc.

Kuhlman (G. C.) Company, 1949 Broadway, Cleveland. Open and closed single and double truck electric and suburban cars. Annual capacity, from 450 to 500.

Lima (The) Locomotive and Machine Company, Lima. Iron, steel, and wooden freight, caboose, mine, and special cars. Annual capacity, 3,000 freight, 300 caboose, and 5,000 special cars.

Minerva Car Works, Pennock Brothers, Minerva. Iron, steel, and wooden freight cars. Annual capacity, 2,000. For sale.

Watt (The) Mining Car Wheel Company, Barnesville. Annual capacity, 10,000 mine cars.

Youngstown (The) Bridge Company, Youngstown. Iron and steel freight cars.

Youngstown (The) Car Manufacturing Company, Youngstown, Mahon-

ing county. Works at Haselton, Mahoning county. Freight cars only. Annual capacity, 3,000.

INDIANA—5.

Haskell and Barker Car Company, Michigan City. Annual capacity, 6,000 freight cars of all kinds.

Indiana Car and Foundry Company, Indianapolis. Works at West Indianapolis, Marion county. All kinds of freight cars. Daily capacity, 15.

Ohio Falls (The) Car Manufacturing Company, Jeffersonville. Freight, passenger, parlor, sleeping, and other cars. Annual capacity, 6,000 freight and 300 passenger cars.

Railway (The) Cycle Manufacturing Company, Hagerstown, Wayne county. Iron and steel light railway inspection cars. Annual capacity, 1,000.

Terre Haute Car and Manufacturing Company, Terre Haute, Vigo county. All kinds of iron, steel, and wooden freight cars. Annual capacity, 7,500.

ILLINOIS—8.

Barker Mine Car and Foundry Company, Springfield. Iron, steel, and wooden mine, brickyard, dry-kiln, and other cars. Annual capacity, 3,000.

Buda Foundry and Manufacturing Company, Harvey, Cook county. Hand, push, section, mine, ore, dump, plantation, and other light cars.

Burton (The) Stock Car Company, 558 Rookery Building, Chicago. Works at Forty-seventh and Morgan sts. Horse and cattle cars for its own use.

Illinois (The) Car and Equipment Company, 1480 Old Colony Building, Chicago; branch office, 66 Beaver st., New York. Works at Hegewisch, Chicago. Annual capacity, 12,000 freight cars. *See Alabama and Ohio.*

Madison Car Works, Missouri Car and Foundry Company, Houser Building, St. Louis, Mo. Works at Madison, Madison county. Iron, steel, and wooden freight, caboose, horse, beer, refrigerator, ore, dump, construction, show, hay, furniture, tank, clay, sand, stock, logging, mining, cane, and other cars. Annual capacity, 12,000. *See Missouri.*

Mt. Vernon Car Manufacturing Company, Mount Vernon, Jefferson county. Annual capacity, 5,000 freight, refrigerator, caboose, and tank cars.

Pullman's Palace Car Company, Pullman. Passenger, street, and freight cars. *See Michigan.*

Wells and French (The) Company, Fisher Building, Chicago. Wooden interurban, street, freight, and refrigerator cars. Annual capacity,

12,000 freight and 1,000 street cars. Is also prepared to build iron and steel cars.

MICHIGAN—6.

Kalamazoo Railroad Velocipede and Car Company, Kalamazoo. Velocipede, hand, push, mine, and sugar-cane cars. Annual capacity, from 4,000 to 5,000.

McCracken and Hovey Car Works, Muskegon. All kinds of freight cars. Annual capacity, 3,000.

Michigan-Peninsular Car Company, Union Trust Building, Detroit, Wayne county. All kinds of freight and refrigerator cars. Annual capacity, 30,000.

Pullman's Palace Car Company, Detroit. Passenger and street cars. *See Illinois.*

Roberts, Throp & Co., Three Rivers, Saint Joseph county. Iron, steel, and wooden hand and push cars. Annual capacity, from 6,000 to 8,000.

Sheffield Car Company, Three Rivers, Saint Joseph county. Iron, steel, and wooden flat, logging, mine, hand, velocipede, plantation, and other cars. Annual capacity, 10,000.

WISCONSIN—1.

Marinette Iron Works, D. Clint Prescott Company, Marinette, Marinette county. Iron, steel, and wooden railroad contractors' dump cars, mine cars, skips, and cages.

MINNESOTA—1.

Rupley Iron Company, Duluth, St. Louis county. Annual capacity, 4,500 freight and 3,500 ore, lumber, and mine cars.

MISSOURI—8.

American Car Company, 1525 Old Manchester Road, St. Louis. Wooden elevated and suburban street cars. Annual capacity, 1,500.

Brownell Car Company, 2300 North Broadway, St. Louis. Wooden street, cable, and electric cars. Annual capacity, 800.

Industrial Iron Works, Pierce & Hall, Clinton. Wooden or metal mine cars. Annual capacity, 1,000.

Laclede Car Company, 4500 North Second st., St. Louis. Street cars only. Annual capacity, 1,000.

Missouri Car and Foundry Company, Houser Building, St. Louis. Works at 2800 DeKalb st. Iron, steel, and wooden freight, fruit, flat, box, circus, furniture, coal, hay, beer, caboose, stock, refrigerator, mine, ore, tank, logging, dump, horse, and other cars. Annual capacity, 24,000. *See Illinois.*

St. Charles Car Company, St. Charles. Iron, steel, and wooden passen-

ger and freight cars of every description. Annual capacity, 6,000 freight and 300 passenger cars.

St. Louis Car Company, St. Louis. Street, cable, and electric cars. Annual capacity, 3,000 cars and trucks.

Whitman Agricultural Company, 6900 South Broadway, St. Louis. Iron, steel, and wooden construction, dump, and other cars. Annual capacity, 2,000.

ARKANSAS—1.

Brinkley Car Works and Manufacturing Company, Brinkley. Box and flat cars.

KANSAS—1.

Kansas City Car and Foundry Company, Kansas City. Wooden freight, mine, logging, and other cars. Annual capacity, about 3,600.

COLORADO—3.

Denver (The) Boiler and Sheet Iron Works Company, Thirty-fifth and Wazee sts., Denver. Iron and steel mine cars. Annual capacity, from 1,000 to 1,500.

Truax (The) Ore Car Works, The Truax Manufacturing Company, 1717 Wazee st., Denver. The Truax patent automatic steel ore cars. Annual capacity, from 1,000 to 1,500.

Woeber Carriage Company, 1346 Eleventh street, Denver. Works at South Denver. Cable and electric street cars. Annual capacity, 300.

OREGON—1.

Columbia (The) Car and Tool Works, 329 Second st., Portland. All kinds of cars, but chiefly a patent combination car. Annual capacity, combination, 25; other kinds, 35; freight, 50.

CALIFORNIA—3.

California Car Works, John Hammond & Co., 101 Townsend st., San Francisco. Wooden cars only. Annual capacity, 1,000 freight, 500 passenger, and 1,000 street cars. Specialty, double-ender cable and electric cars.

Carter Brothers, 42 Market st., San Francisco. Works at Newark, Alameda county. Wooden cars only. Annual capacity, 500 freight, 50 passenger, and 150 street, cable, and electric cars. Also make hand cars.

Risdon (The) Iron and Locomotive Works, Beale and Howard sts., San Francisco. Annual capacity, 1,000 flat, 1,000 mine, and 1,000 sugar cane cars.

UNITED STATES.

Total number of carbuilding works in the United States in April, 1898, not including works operated by railroad companies: 121.

CANADA.

BLAST FURNACES.

NOVA SCOTIA—4.

Bridgeville Furnace, The Mineral Products Company, lessee, Hillsboro, New Brunswick. Furnace at Bridgeville, Pictou county, Nova Scotia; mines at Hillsboro, New Brunswick. One stack, 55 x 11, built in 1892 and first blown in in December, 1892, with charcoal as fuel; fuel changed to coke and charcoal in 1897; two Cooper-Durham stoves; ores, briquettes made from Hillsboro manganese ore, ("wad,") a mixture of iron and manganese; product, ferro-manganese; annual capacity, 7,300 gross tons. Frederick C. Sayles, President, Pawtucket, Rhode Island; Frederick C. Sayles, Jr., Treasurer, Providence, Rhode Island; Edwin F. Ward, Secretary, 55 West Thirty-sixth st., New York City; Russell P. Hoyt, General Manager, Hillsboro, New Brunswick, Canada. Owned and formerly operated by the Pictou Charcoal Iron Company Limited, of Bridgeville, Nova Scotia.

Londonderry (The) Iron Company Limited, Londonderry. Main office, Montreal. Works at Acadia Iron Mines, (near Londonderry,) Colchester county. Two stacks: Furnace A, 75 x 18, and Furnace B, 62 x 18, built in 1875-6 and blown in in 1877; Furnace A rebuilt in 1883, 1891, and 1895; one Ford iron-pipe and three Siemens-Cowper fire-brick stoves; fuel, coke, made from coal mined in Pictou and Cumberland counties; ores, limonite, carbonate, and red hematite from Colchester and Annapolis counties; product, foundry pig iron; annual capacity, 40,000 gross tons. Brand, "Siemens." A cast-iron pipe foundry is operated in connection with the works. Sales made by the company. *See Rolling Mills in Nova Scotia.*

Nova Scotia (The) Steel Company Limited, New Glasgow, Pictou county. Main office, New Glasgow; branch office, 405 Board of Trade Building, Montreal. (Formed by the consolidation of the New Glasgow Iron, Coal, and Railway Company Limited and the Nova Scotia Steel and Forge Company Limited.) Furnace at Ferrona, Pictou county. One stack, 65 x 15, built in 1892; first blown in in August, 1892; three Massicks & Crooke stoves; fuel, coke, made from coal mined near the furnace; ores, local brown and red hematite and Newfoundland; product, foundry pig iron; annual capacity, 25,000 gross tons. Brand, "Ferrona." (Formerly operated by the New Glasgow Iron, Coal, and Railway Company Limited.) Joseph

D. Fraser, Superintendent. Sales made by the company. *See Rolling Mills and Steel Works in Nova Scotia.*

QUEBEC—3.

Canada Iron Furnace Company Limited, Montreal. Furnace at Radnor Forges, Champlain county. One stack, 40 x 9, built and blown in in 1891; steam and water power; one Drummond pipe stove; warm blast; fuel, charcoal; ores, lake and bog from the company's mines in the Three Rivers district and Lac-a-la-Tortue; product, special charcoal pig iron for car wheels, chilled rolls, armor plate, special qualities of wrought-iron boiler plates, and like purposes; annual capacity, 10,000 gross tons. Brand, "C. I. F." (The present stack takes the place of the old Radnor Furnace.) P. H. Griffin, President, and T. Guilford Smith, Vice-President, Buffalo, New York; George E. Drummond, Managing Director and Treasurer, and Thomas J. Drummond, Secretary, Montreal; John J. Drummond, Superintendent, at the furnace. Selling agents, Drummond, McCall & Co., Montreal.

McDougall (John) & Co., 574 William street, Montreal. Furnaces at Drummondville, Drummond county. Two stacks: Grantham Furnace, 35 x 10, built and blown in in 1880; St. Francis Furnace, 32 x 9, built and blown in in 1881 and rebuilt in 1897; warm blast; water-power; fuel, charcoal; ore, local limonite; product, car-wheel pig iron; annual capacity, 4,000 gross tons. George McDougall, Manager.

ONTARIO—1.

Hamilton Furnace, The Hamilton Blast Furnace Company Limited, Hamilton, Wentworth county. One stack, 75 x 16, built in 1894-5; blown in December 30, 1895; three Gordon-Whitwell stoves; fuel, Connellsville coke; ores, Ontario hematite and magnetic; product, foundry pig iron; annual capacity, 50,000 gross tons. Brand, "Hamilton." (Formerly operated by The Hamilton Iron and Steel Company Limited.) John H. Tilden, President; Robert Hobson, Secretary and Treasurer.

BUILDING—1.

Deseronto Furnace, Deseronto Iron Company Limited, Deseronto, Ontario. Building a stack at Deseronto to be 60 x 10; fuel to be used, charcoal; ores, American from the Lake Superior region and local Canadian; product, malleable and car-wheel pig iron; estimated annual capacity, 12,000 gross tons. E. W. Rathbun, President; William Gerhauser, Vice-President; F. A. Goodrich, Secretary; F. S. Rathbun, Treasurer. Sales will be made by the company. The furnace will probably be completed and ready to commence operations before the close of 1898. ■

ROLLING MILLS AND STEEL WORKS.

NOVA SCOTIA—5.

Dartmouth Rolling Mills, Dartmouth, Halifax county. Built in 1896 and put in operation in that year; 1 heating furnace, 3 forge fires, one 10-inch train of rolls, and 1 hammer; product, bar iron; annual capacity, 1,500 gross tons. Fuel, coal. William Jones, Manager. Selling agent, E. D. Adams, Halifax.

Halifax Rolling Mills Company, Halifax, Halifax county. Works on the harbor, three miles from the city. Built in 1878; 2 heating furnaces, 2 trains of rolls, and 20 cut-nail machines. Fuel, Nova Scotia soft coal. Idle for some time and for sale. E. D. Adams, Agent, Halifax.

Londonderry (The) Iron Company Limited, Londonderry. Main office, Montreal. Works at Acadia Iron Mines, (near Londonderry,) Colchester county. Built in 1875-6 and put in operation in 1876; 1 single and 8 double puddling furnaces, 1 scrap and 4 heating furnaces, 3 trains of rolls, (9, 16, and 18-inch,) and 3 steam hammers; product, muck bar, bar iron, and nail plate; annual capacity, 9,000 gross tons. Fuel, bituminous coal. Brand, "Siemens." A. T. Paterson, President; John Turnbull, Vice-President; R. L. Hildreth, Secretary; C. S. Virtue, Treasurer; C. A. Meissner, General Manager. Sales made by the company. *See Furnaces in Nova Scotia.*

Nova Scotia (The) Steel Company Limited, New Glasgow, Pictou county. Main office, New Glasgow; branch office, 405 Board of Trade Building, Montreal. (Formed by the consolidation of the New Glasgow Iron, Coal, and Railway Company Limited and the Nova Scotia Steel and Forge Company Limited.) Forge built in 1872 and steel plant in 1882; 12 forge fires, 10 coal and 5 gas heating furnaces, 6 trains of rolls, (two 9, one 12, one 16, one 20, and one 26-inch,) 5 hammers, (3 upright, from 10 cwt. to 5 tons, and 2 helve,) and one 20-gross-ton and one 25-gross-ton acid and one 30-gross-ton basic open-hearth steel furnace; first steel made in 1883; product, railway, marine, and engine forgings, car axles, mine rails, machinery, spring, and agricultural-implement steel, steel plates, angles, and iron and steel merchant bars; annual capacity, 40,000 gross tons of open-hearth steel ingots and 33,000 tons of finished iron and steel products. Fuel, bituminous coal and producer gas. (Formerly operated by the Nova Scotia Steel and Forge Company Limited.) John F. Stairs, President; Graham Fraser, Vice-President and General Manager; H. Ritchie, Treasurer; Thomas Cantley, Secretary; S. A. Fraser, Superintendent of Steel Works; H. Graham, Purchasing Agent. Sales made by the company. *See Furnaces in Nova Scotia.*

Pictou Rolling Mill, Pictou Charcoal Iron Company Limited, Bridgeville, Pictou county. Built in 1892 and put in operation the same

year; 2 double puddling furnaces, 2 single puddling furnaces, 4 heating furnaces, 3 forge fires, 5 trains of rolls, (three 18-inch hot and two 18-inch cold,) and one 20-ton hammer; product, muck bar and billets; annual capacity, 4,000 gross tons. Fuel, bituminous coal and charcoal. Brand, "Bridgeville." M. H. Fitzpatrick, President, New Glasgow; A. C. MacDonald, Secretary and Treasurer, Pictou; W. B. Moore, General Manager, Bridgeville. Selling agents, J. & H. Taylor, Montreal.

NEW BRUNSWICK—2.

Coldbrook Rolling Mills, The Coldbrook Iron and Steel Company, (Limited,) Coldbrook, St. John county. Built in 1864 and remodeled and enlarged in 1874; 1 forge fire, 2 heating furnaces, 2 trains of rolls, (one 10 and one 18-inch,) and 2 spike machines; product, bar iron, iron and steel nail plate, ship and railway spikes, mine rails, and bridge bolts; annual capacity of rolled iron and steel, 5,000 gross tons. Fuel, bituminous and anthracite coal. C. H. Lissemore, President; James Wilks, Vice-President; George Quigley, Superintendent.

Portland Rolling Mills, The Portland Rolling Mills Company Limited, Strait Shore, St. John, St. John county. Works built in 1856 and rolling mill added in 1860; burned and rebuilt in 1889; 1 single puddling furnace, 5 heating furnaces, 3 trains of rolls, (12 and 18-inch bar and 18-inch nail-plate,) 2 railway spike machines, one 5-ton helve hammer, 38 cut-nail machines, and 18 tack and shoe-nail machines; also a complete set of horseshoe machinery; product, bar iron, car axles, nail plate, street and mine rails, fish-plates, ship and railway spikes, knees for ships, shafting, cut nails, shoe nails, tacks, horseshoes, etc.; annual capacity, 10,000 gross tons of finished products, 150 tons of shoe nails and tacks, 45,000 kegs of cut nails and spikes, and 4,000 kegs of horseshoes. Fuel, anthracite and bituminous coal. (Formerly operated by J. Harris & Co.) J. C. Robertson, President; S. Hayward, Vice-President; James Mowat, Secretary and Treasurer.

QUEBEC—5.

Canada Rolling Mills, Nail, Cut Tack, and Spike Works, Peck, Benny & Co., 319-21 Board of Trade Building, Montreal. Works on Mill st. Built about 1828; water-power; equipped with heating furnaces, trains of rolls, cut-nail machines, and wire-nail machines; product, iron and steel cut nails, clinch and patent pressed nails, tacks, brads, shoe and wire nails, horse nails, Rhode Island horseshoes, ship and railway spikes, and bar iron and steel. Fuel, bituminous coal.

Grand Trunk Railway Rolling Mill, Point St. Charles, Montreal. Built in 1891-2 and first put in operation May 9, 1892; 2 heating furnaces, one 3-high 12-inch train of rolls, and 4 wire-nail machines; product, bars, angles, and wire nails; annual capacity, 4,000 gross tons of rolled products and 25 to 30 tons of wire nails. Fuel, bituminous coal.

Metropolitan Rolling Mills, Abbott & Co., 219 Delorimier ave., Montreal. Built in 1883; equipped with heating furnaces, trains of rolls, etc.; also nail, railroad spike, pressed spike, horseshoe, washer machines, etc.

Montreal Rolling Mills Company, Montreal. Works at Ste. Cunegonde, Hochelaga county. Built about 1857; 4 coal and 3 gas heating furnaces, 3 trains of rolls, (9-inch, 12-inch, and 18-inch,) 75 cut-nail machines, and 55 wire-nail machines; product, bar and horseshoe iron, nail plate, skelp, horseshoes, horseshoe nails, cut nails, iron and steel wire nails, and wire; annual capacity, 9,000 gross tons of bar and horseshoe iron, 4,000 tons of skelp, 9,000 tons of nail plate, 25,000 kegs of horseshoes, 25,000 boxes of horseshoe nails, 125,000 kegs of cut nails, 7,500 tons of wire, and 75,000 kegs of wire nails. Fuel, producer gas and bituminous coal. Brand, "M. R. M. Co.," inclosed in a semi-circle; trade-mark for steel horseshoes, "XL." Andrew Allan, President; Hugh McLennan, Vice-President; William McMaster, Managing Director; A. F. Macpherson, Secretary and Treasurer. Selling agents, W. D. Taylor, Winnipeg, Manitoba; James Crawford, Vancouver and Victoria, British Columbia; John Peters & Co., Halifax, Nova Scotia.

Pillow and Hersey Manufacturing Company Limited, 518 Board of Trade Building, Montreal. Rolling mills and nail works, 104 St. Patrick st.; tack and bolt works, 105 Mill st. Built in 1859; 8 heating furnaces, 4 trains of rolls, (9-inch guide, 12 and 18-inch bar, and 18-inch plate,) 96 cut-nail machines, and 26 wire-nail machines; product, cut nails, wire nails, bar iron, railway and pressed spikes, horseshoes, tacks, bolts, and nuts; annual capacity, single turn, for cut nails, 118,000 kegs; for wire nails, 25,000 kegs. Fuel, bituminous and anthracite coal. John A. Pillow, President; John R. Hersey, Vice-President; W. W. Near, Secretary. Selling agents, J. H. Webber, Toronto; Charles Stimson, Vancouver, British Columbia; J. G. T. Cleghorn, Winnipeg; John W. Stairs, Halifax.

ONTARIO—5.

Guelph-Norway Iron and Steel Works, Guelph, Wellington county. Built in 1895 and first put in operation January 6, 1896; 8 forge fires, one heating furnace, 2 trains of rolls, (one 10 and one 18-inch,) and one hammer; product, bar iron and bar steel; annual capacity, 5,000 gross tons. Fuel, bituminous coal. (Formerly operated by The Guelph-Norway Iron and Steel Company Limited.) Idle and for sale or lease. Address all communications to J. E. McElderry, Guelph.

McDonell (The) Rolling Mill Company, Sunnyside, Toronto. Built in 1893 and put in operation in the same year; 3 coal heating furnaces and 2 trains of rolls (9 and 20-inch); product, merchant bar iron, agricultural implement and carriage iron, channels, angles, bev-

eled-edge flats, etc.; annual capacity, 6,000 gross tons. Fuel, United States bituminous coal. Adding one double busheling furnace, one 20-inch train of rolls, and a rotary squeezer. Richard McDonell, Manager. Selling agents, Leather & Watson, Hamilton, Ontario. Owned by Mary McDonell.

Ontario Rolling Mill Company, Hamilton. Three mills, two at Hamilton, Wentworth county, and one at Swansea, York county. Hamilton Mills, built in 1861; 1 single and 1 double busheling furnace, 4 double puddling furnaces, 9 coal heating furnaces, 5 trains of rolls, (14-inch muck, 9 and 10-inch guide, 20-inch bar, and 20-inch plate,) 3 hammers, (5-ton and 2-ton upright and one helve,) and 45 cut-nail machines; product, bar and band iron and steel, fish-plates, nail plate, forgings, cut nails, rivets, and washers; annual capacity, 100,000 kegs of cut nails and 27,000 gross tons of other finished products. Swansea Mill, built in 1888; one coal and 3 Smith gas heating furnaces, one 10-inch train of rolls, and one 5,000-lb. upright hammer; product, bar iron; annual capacity, 10,800 gross tons. Fuel, Pennsylvania bituminous coal in all the works. C. E. Doolittle, President; C. S. Wilcox, Vice-President and Treasurer; W. A. Child, Secretary.

Number of blast furnaces in Canada: 8 completed and 1 building. Of the completed furnaces 4 use coke, 1 uses coke and charcoal, and 3 use charcoal for fuel. The furnace that is building will use charcoal. Number of rolling mills in Canada: 17. Of these 1 makes both acid and basic open-hearth steel.

MEXICO.

BLAST FURNACES.

DURANGO—2 COMPLETED AND 1 BUILDING.

Durango (The) Iron Works, Torres, Ugarte & Heredia, City of Durango.

Furnace 6 miles from Durango. One small charcoal stack built about 1850; water-power; product, mill and foundry pig iron; daily capacity, $2\frac{1}{2}$ gross tons. A foundry is connected with the works. (Formerly called the Rosa Flores Furnace.) *See Rolling Mills in Durango.*

Helfenistein Furnace, Mexican National Iron and Steel Company, 2d Providencia, No. 4, City of Mexico. One completed and one building stack in the City of Durango. Completed stack, 54 x 10, built and blown in in 1887; rebuilt in 1894; steam-power; two iron-pipe stoves; fuel, coke and charcoal, the coke being made from coal mined near Sabinas; ore, low in phosphorus, mined near the furnace; product, foundry and mill pig iron; annual capacity, 15,000 gross tons. The company is erecting a new stack, which will be 40 x 10. John Skinfill, Manager. *See Furnaces in Jalisco and Hidalgo. See Rolling Mills in Durango and Hidalgo.*

JALISCO—4.

Corcuera, (Manuel L.,) Guadalajara. Furnace at Sierra de Tapalpa, district of Sayula. One stack, 50 x 9, built and blown in in 1869; hot blast; steam-power; fuel, charcoal; ore, local hematite; product, mill pig iron; annual capacity, 3,600 gross tons. T. Rubalcaba, Manager. *See Rolling Mills in Jalisco.*

Ferreria de Providencia, Manuel Aizpuru, Guadalajara. Furnace located on the Hacienda Mata Cristo, 10 miles from Zapotlan. One stack, 32 x 7, built in 1890; cold blast; water-power; fuel, charcoal; ore, hard red oxide of Bessemer quality; product, foundry pig iron and castings; annual capacity, 2,000 gross tons. *See Rolling Mills in Jalisco.*

Mexican National Iron and Steel Company, 2d Providencia, No. 4, City of Mexico. Comanja Furnaces, at Comanja, district of Lagos; two stacks, each 37 x 9; time of building uncertain; cold-blast; steam-power; fuel, charcoal; ore, local brown hematite; product, gray forge pig iron; total annual capacity, 3,200 gross tons. Brand, "Comanja." *See Furnaces and Rolling Mills in Durango and Hidalgo.*

HIDALGO—7.

Mexican National Iron and Steel Company, 2d Providencia, No. 4, City of Mexico. Seven cold-blast charcoal furnaces, all in Hidalgo: Apulco Furnace, at Apulco, one stack, $34\frac{1}{2} \times 9$, built about 1835; water and steam power; ore, local brown hematite; product, gray forge pig iron; brand, "Apulco;" W. Skinfill, Manager. Encarnacion and Guadalupe Furnaces, at Encarnacion and Guadalupe, three stacks, two 35×9 and one $35 \times 9\frac{1}{2}$; Encarnacion No. 1 was built about 1850, Encarnacion No. 2 was built in 1892, and Guadalupe was built in 1845; steam-power is used at Encarnacion and water-power at Guadalupe; ore, local magnetic; product, mottled and white pig iron; brand, "Encarnacion;" John H. Thomas, Manager. La Trinidad Furnace, at La Trinidad; post-office and telegraph address, Tulancingo; one stack, $34\frac{3}{4} \times 9$, built in 1850; water and steam power; ore, local brown hematite; product, gray forge pig iron; brand, "Trinidad;" W. Skinfill, Manager. Los Reyes Furnace, at Los Reyes; post-office and telegraph address, Tulancingo; one stack, $32 \times 10\frac{5}{12}$, built about 1845; water-power; ore, local brown hematite; product, gray forge pig iron; brand, "Reyes." San Miguel Furnace, at Zacualtipan, one stack, $32 \times 8\frac{3}{4}$, built about 1859; water and steam power; ore, local brown hematite; product, gray forge pig iron; brand, "Zacualtipan;" R. Honey, Jr., Manager. The annual capacity of these furnaces is about 4,000 gross tons for the two Encarnacion stacks, 1,800 gross tons each for Guadalupe and San Miguel, and 1,600 gross tons for each of the others. Selling agents, the company, Valentin, Elcoro & Co., and others. *See Furnaces in Durango and Jalisco. See Rolling Mills in Durango and Hidalgo.*

MEXICO—1.

Ferreria del Salto, LaGlise & Sons, Toluca. One small charcoal blast furnace, located 18 leagues west of Toluca; date of erection uncertain; water-power; ore, local hematite; annual capacity, about 100 gross tons of charcoal pig iron.

OAXACA—7 COMPLETED STACKS AND 1 BUILDING.

La Providencia Furnaces, Francisca Barriga & Co., City of Oaxaca. Furnaces located in the district of Tomellin. Three stacks; cold-blast; water-power; fuel, charcoal; product, foundry and forge pig iron. A forge for the production of flat and round bar iron by hand hammers is connected with the furnace.

La Reforma Furnace, Francisco Quijano, City of Oaxaca. Furnace at San Bernardo, district of Villa Alvarez. One stack, 30×8 , built in 1882 and blown in in 1883; cold blast; water-power; fuel, charcoal; ore, hematite; product, foundry and forge pig iron; annual capacity, 2,500 gross tons. Brand, "Q." Selling agent, F. Quijano, Oaxaca.

A foundry and a forge are connected with the furnace; in the latter bars and rounds are produced by hand hammers.

San Rafael Furnaces, Gustavo Stein, Tlaxiaco, Oaxaca. Furnaces at Santa Lucia, Monte Verde. Three stacks, built and blown in in 1887; cold blast; water-power; fuel, charcoal; ore, native magnetic; product, foundry and forge pig iron. Brand, "R." Another stack is being erected. Vicente Jimenez, Superintendent. Selling agent, G. Stine. A forge for the production of bars and rounds by hand hammers is connected with the furnaces.

ROLLING MILLS AND STEEL WORKS.

DURANGO—2.

Durango (The) Iron Works, Torres, Ugarte & Heredia, City of Durango. Works 6 miles from Durango. Two puddling furnaces, one heating furnace, and one train of rolls; water-power; product, merchant bars; annual capacity, 1,000 gross tons. (Formerly operated by the Rosa Flores Blast Furnace Company.) *See Furnaces in Durango.*

Durango Rolling Mills, Mexican National Iron and Steel Company, 2d Providencia, No. 4, City of Mexico. Works in the City of Durango. Built in 1886 and put in operation in 1887; 5 double puddling furnaces, 2 forge fires, one Siemens gas heating furnace, and 2 trains of rolls (18-inch puddle with squeezers and 10-inch guide); steam-power; product, bar iron; daily capacity, double turn, 25 gross tons. Fuel, bituminous coal. Brand, "Durango." John Skinfill, Manager. Officers of the company: Richard Honey, President, and R. Robles, Treasurer, City of Mexico; J. G. Rounds, Vice-President, and J. L. Callanan, Secretary, Des Moines, Iowa, United States. *See Rolling Mills in Hidalgo. See Furnaces in Durango, Jalisco, and Hidalgo.*

CHIHUAHUA—1.

Compañía Industrial Mexicana, City of Chihuahua. Built in 1891 and put in operation in 1892; 2 Siemens gas heating furnaces, 3 trains of rolls, (8, 12, and 20-inch,) one 1,500-lb. hammer, and 7 cut-nail machines; steam-power; product, merchant bar iron, bolts, nuts, washers, horseshoes, and cut nails; annual capacity, 10,000 gross tons of rolled products and 12,000 kegs of nails. Fuel, manufactured gas. Brand, "C. I. M." Also operates a machine shop and foundry. Building an open-hearth steel plant, to contain one 10-gross-ton basic furnace and 2 gas producers. Enrique C. Creel, President; Juan A. Creel, Manager and Superintendent. Selling agent, José Ma del Rio, City of Mexico.

JALISCO—2.

Corcuera, (Manuel L.,) Guadalajara. Works (Ferreria de Tula) at Sierra de Tapalpa, district of Sayula. Rolling mill built and put in operation in 1873; 2 single puddling furnaces, 4 forge fires, one heating furnace, one 9-inch and one 12-inch train of rolls, and one 1-ton upright and 2 trip hammers; product, all sizes of merchant iron; annual capacity, 1,800 gross tons. Fuel, wood. A foundry is connected with the works. *See Furnaces in Jalisco.*

Ferreria de Providencia, Manuel Aizpuru, Guadalajara. Works located on the Hacienda Mata Cristo, 10 miles from Zapotlan. Built in 1895; 2 large double puddling furnaces, 1 heating furnace, and 1 train of rolls; product, merchant iron, bands, plates, etc.; daily capacity, 3 gross tons; a forge, a foundry, and a machine shop are connected with the works; steam and water power. *See Furnaces in Jalisco.*

HIDALGO—2.

Mexican National Iron and Steel Company, 2d Providencia, No. 4, City of Mexico. Two completed rolling mills and a partly-erected open-hearth steel plant in Hidalgo: San Miguel Works, at Zacualtipan, built about 1859; 2 single puddling furnaces, one heating furnace, 2 trains of rolls, (one 15-inch puddle and one 11-inch guide,) and one 1-ton hammer; product, rounds and squares up to 4 inches and flats up to 6 inches in width; annual capacity, 1,600 gross tons; brand, "Zacualtipan;" one 5-ton Siemens open-hearth steel furnace partly erected; work suspended; R. Honey, Jr., Manager. Encarnacion Works, at Encarnacion, built about 1854; 3 puddling furnaces, one heating furnace, 2 trains of rolls, (15-inch puddle and 11-inch guide,) and one 22-cwt. hammer; product, same as San Miguel Works; annual capacity, 1,800 gross tons; brand, "Encarnacion;" John H. Thomas, Manager. Water and steam power are employed at the San Miguel Works and steam-power at the Encarnacion Works; wood is used for fuel at both works. *See Rolling Mills in Durango. See Furnaces in Durango, Jalisco, and Hidalgo.*

Number of furnaces in Mexico: 21 completed stacks and 2 stacks building. Of these 20 use charcoal for fuel and 1 uses both coke and charcoal.

Number of rolling mills in Mexico: 7. Of these 1 is erecting a basic open-hearth steel plant and 1 has an open-hearth steel plant partly erected upon which work has been suspended.

In addition to the forges in Mexico that are connected with blast furnaces and rolling mills there are a number of independent Catalan forges that we have not attempted to describe.

LATEST INFORMATION.

The information given below comprises changes in existing works which were made while the Directory was going through the press, information which was not received in time to appear in its proper place, and descriptions of new enterprises which have been decided upon since April 1, 1898. It makes the book complete to June, 1898.

BLAST FURNACES.

PENNSYLVANIA.

Allentown Iron Works, Allentown Iron Company, Allentown. Two stacks; Edward T. Clymer, Manager, resigned; now Manager of the Antrim Iron Company, Mancelona, Michigan. (Page 7.)

Blair Furnace, Cambria Iron Company, Harrison Building, Philadelphia. Furnace at Hollidaysburg, Blair county; one stack; abandoned in 1897; dismantled in the spring of 1898. (Page 66.)

Douglas Furnaces, Sharpsville, Mercer county. Two alternate stacks; formerly operated under lease by Corrigan, McKinney & Co.; now owned by The Carnegie Steel Company, Limited, of Pittsburgh; Carnegie Company does not expect to operate the furnaces. (Page 21.)

Ella Furnace, Trustees of Nimick & Co., 229 Water st., Pittsburgh. Furnace at West Middlesex, Mercer county. One stack, 70 x 14, built and blown in in 1882; to be sold on July 21, 1898. (Page 21.)

Glendon Iron Works, Glendon Iron Company, Easton, Northampton county. Furnaces situated at Glendon, near Easton. Two stacks, No. 2 and No. 3, each 81 x 18. Original furnaces were first blown in in 1844, 1845, 1850, and 1869; fuel, anthracite coal and coke; abandoned and now being dismantled. (Page 9.)

Laughlin & Co. Limited, Pittsburgh. Will rebuild one of their Eliza Furnaces during 1898; present size, 75 x 15; new size to be 100 x 22. (Page 20.)

Lebanon Furnaces, B. D. and E. R. Coleman, Managers, Lebanon, Lebanon county. Remodeling and enlarging Furnace No. 3; product, Bessemer pig iron. Selling agents, J. W. Hoffman & Co., Harrison Building, Philadelphia. (Page 15.)

Sharpsville Furnace, Sharpsville Furnace Company, (not incorporated,) Sharpsville, Mercer county. Annual capacity of pig iron should be 72,000 gross tons instead of 60,000 tons. (Page 22.)

Shenango Valley Steel Company, New Castle, Lawrence county. Company expects to install new machinery at its Shenango Fur-

naces in 1899; will then change the two alternate stacks to two separate furnaces. (Page 23.)

MARYLAND.

Catoctin Mountain Iron Company, Catoctin Furnace P. O., Frederick county. Deborah (coke) and Isabella (charcoal) furnaces to be sold by Receivers at Frederick City on Thursday, July 7, 1898. (Page 27.)

TENNESSEE.

Carnegie Furnace, Johnson City, Washington county. One stack, 75 x 16, nearly completed by the Carnegie Iron Company; work suspended in 1892; purchased in 1898 by George B. Parker; furnace will probably be completed and blown in on its present site; special low-phosphorus Bessemer pig iron will be made. Guy R. Johnson, Manager, Embreville, Tennessee. (Page 35.)

ALABAMA.

Mary Pratt Furnace, Birmingham. One stack; sold on May 2 and purchased by T. J. Cornwell, of Bessemer, Alabama, who holds it for the benefit of the bondholders. For sale. (Page 40.)

OHIO.

Wellston (The) Iron and Steel Company, Wellston, Jackson county. Three stacks. J. C. Clutts, President; O. B. Gould, Vice-President; H. S. Willard, Secretary and Treasurer. Sole sales agents, Rogers, Brown & Co., Cincinnati. (Page 54.)

MICHIGAN.

Union Iron Company, Jefferson avenue east, Detroit, Wayne county. One stack, 46 x 10, built in 1871-2 and blown in in July, 1872; product, malleable and car-wheel charcoal pig iron; abandoned and to be dismantled. (Page 59.)

ROLLING MILLS AND STEEL WORKS.

MASSACHUSETTS.

Danvers Iron Works, Sylvester & Co., Boston. Address changed from 8 Oliver st. to 70 Kilby st. (Page 74.)

CONNECTICUT.

Thames (The) Iron Works, Norwich. May remove rolling mill from Norwich to Belleville, Ontario, Canada. (Page 78.)

NEW JERSEY.

Ludlum (The) Steel and Spring Company, Pompton, Passaic county. Built in 1863; annual capacity of crucible steel ingots, single turn, 840 gross tons; product, crucible cast steel and railway car springs;

annual capacity, single turn, 850 gross tons of rolled products and 150 tons of forged products. Brand, "Pompton." (Formerly operated by the Pompton Steel and Iron Company.) Rufus W. Peckham, Jr., President; James W. Cox, Jr., Vice-President; William E. Ludlum, Secretary and Treasurer. (Page 86.)

PENNSYLVANIA.

Brandywine Rolling Mills, Worth Brothers Company, Coatesville, Chester county. Adding one 35-gross-ton acid open hearth steel furnace to its steel department. (Page 93.)

National Tin Plate Company, Monessen. Will increase number of mills from 12 hot and 12 cold to 14 hot and 15 cold. (Page 138.)

Pottstown Iron Works, Pottstown Iron Company, Pottstown. Philadelphia office, 400 Chestnut st. William H. Hiester, Treasurer, vice Charles H. Ashburner, resigned. (Page 100.)

MARYLAND.

South Baltimore Rolling Mill Company, 44 South st., Baltimore. Rolling mill at South Baltimore, Anne Arundel county, partly erected in 1892; work suspended; to be dismantled. (Page 147.)

KENTUCKY.

Ashland Steel Company Incorporated, Ashland, Boyd county. Adding to its Bessemer steel plant and rolling mill a Garrett wire-rod mill with a daily capacity of 350 gross tons, a continuous train of rolls for sheet and tinplate bars, and a wire-drawing plant. (Page 151.)

Norton Iron Works, Ashland, Boyd county. May dismantle a number of their cut-nail machines and install wire-nail machines in their place. (Page 152.)

OHIO.

Belfont Iron Works, Belfont Iron Works Company, Ironton, Lawrence county. May dismantle a number of their cut-nail machines and install wire-nail machines in their place. (Page 170.)

Burgess Steel and Iron Works, Portsmouth, Scioto county. Built in 1871; works entirely destroyed by fire on June 7, 1898; will be rebuilt as soon as possible. (Page 171.)

Dresden (The) Iron and Steel Sheet Company, Dresden, Muskingum county. Building a rolling mill to contain 2 sheet furnaces, 2 pair furnaces, 2 annealing furnaces, 3 hot mills, (24 x 38-inch,) and one cold mill (22 x 44-inch); product, iron and steel sheets; annual capacity, 6,300 gross tons. Fuel, coal. T. J. McCullough, President; Harry Ashton, Vice-President; A. J. McCullough, Secretary, Treasurer, and General Manager.

Kelly Nail Works, Kelly Nail and Iron Company, Ironton, Lawrence county. May dismantle a number of their cut-nail machines and install wire-nail machines in their place. (Page 172.)

Mansfield Machine Works, Mansfield, Richland county. Rolling mill and seamless-drawn steel tube works now owned by the Shelby Steel Tube Company, general office, American Trust Building, Cleveland, Ohio. Known as Mansfield Works, (Factory H.) (Page 166.)

INDIANA.

National (The) Tin Plate Company, Anderson, Madison county. Will increase number of mills from 6 hot and 6 cold to 8 hot and 8 cold. (Page 177.)

ILLINOIS.

Plano Steel Works, Plano Steel Company, Plano, Kendall county. Rolling mill and machinery sold on June 16, 1898, to Albert H. Sears. (Page 183.)

WISCONSIN.

West Superior Iron and Steel Works, West Superior, Douglas county. Formerly operated by the West Superior Iron and Steel Company; now owned by the Wisconsin Steel Company. F. T. Gates, President; H. W. deForest, Vice-President; E. V. Cary, Secretary and Treasurer; Robert Kelly, Agent. (Page 188.)

MISSOURI.

Kansas City (The) Bolt and Nut Company, Kansas City. Works at the corner of Independence and Centropolis aves. Built in 1887-8 and first put in operation in January, 1889; 2 heating furnaces and one 10-inch train of rolls; product, bar and bolt iron; also bolts, nuts, spikes, etc.; annual capacity, 12,000 gross tons of bar iron and 5,000 tons of bolts, nuts, etc. Fuel, producer gas in rolling mill and petroleum in bolt works. J. H. Sternbergh, President, Reading, Pa.; P. H. Sternbergh, Vice-President and Treasurer, and R. C. Howes, Secretary, Kansas City. Selling agent, Francis T. West, Rookery Building, Chicago. *See also Reading Bolt and Nut Works, Eastern Pennsylvania.* (Page 190.)

WIRE-NAIL WORKS.

Arrow Works, Anderson, Indiana. Now operated by the United States Wire and Nail Company. (Page 275.)

CAST-IRON SOIL AND PLUMBERS' PIPE WORKS.

Sisson and Currier Company, Worcester, Massachusetts. Works, cor. of First and C sts., South Boston. Product, cast-iron soil and plumbers' pipe. Sizes, 2 to 6 inches, light and heavy grades. Specialty, "Sisson insertable joint fitting."

IRON AND STEEL CHAIN WORKS.

Morse Chain Company, Trumansburg, New York. Destroyed by fire early in June, 1898. To be rebuilt at once. (Page 318.)

INDEX TO NAMES OF WORKS.

This index includes the names of all the blast furnaces, rolling mills, steel works, tinplate works, and forges and bloomaries which are named in this Directory, including blast furnaces and rolling mills and steel works in Canada and Mexico.

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